Dental Abstracts

a selection of world dental literature

AMERICAN DENTAL ASSOCIATION

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Lon W. Morrey, D.D.S., editor
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Not all dentists realize the necessity of becoming fully conversant with the properties of different types of elastic impression material and adept in their use. The author explains the advantages of two types of such materials and describes three technics employed in their use.

Taking the impression: practical technics

John J. O'Connell, D.D.S., Chicago*

Since the development of the polysulfide and silicone elastomers, it has become possible for the general practitioner to have at his command a material ready for immediate use, even if he needs it only occasionally during his diversified day. By employing either of these elastic impression materials he can obtain an accurate result through an indirect technic. Most important, he can do it with little, or no, addition to the existing facilities in his office.

Both the silicone elastomer and the polysulfide elastomer are practical for indirect technics. Polysulfide elastomer is superior in dimensional stability and accuracy and it possesses much longer shelf life. Although the differences in the dimensional accuracy and the dimensional stability of the two compounds are of academic rather than of clinical importance, the difference in their shelf life is important to the dentist. The hydroxyl or (OH) radical terminates the silicone molecule and makes it chemically unstable. This, of course, gives the silicone rubber material a very short shelf life. The polysulfide rubber possesses a more stable terminating radical—the sulfur-acid or (SA) radical. Consequently, polysulfide rubber has a much longer shelf life than silicone rubber.

The three impression taking technics described use materials that are staples in most offices.

Alginate Technic

The first method employs two elastic impression materials: irreversible hydrocolloid (alginate) and polysulfide rubber. The trays which

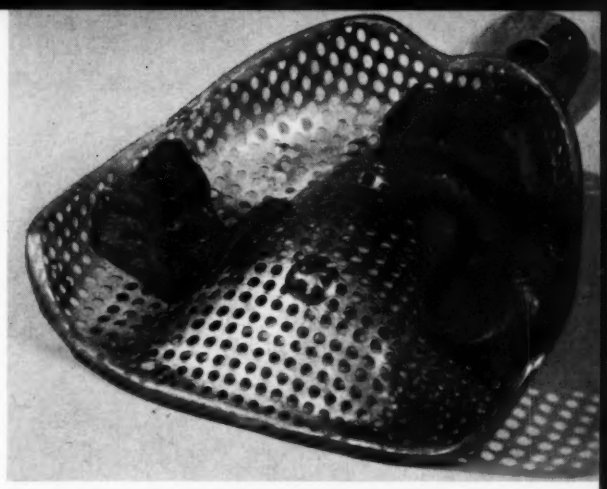

Figure 1 Perforated tray with compound stops

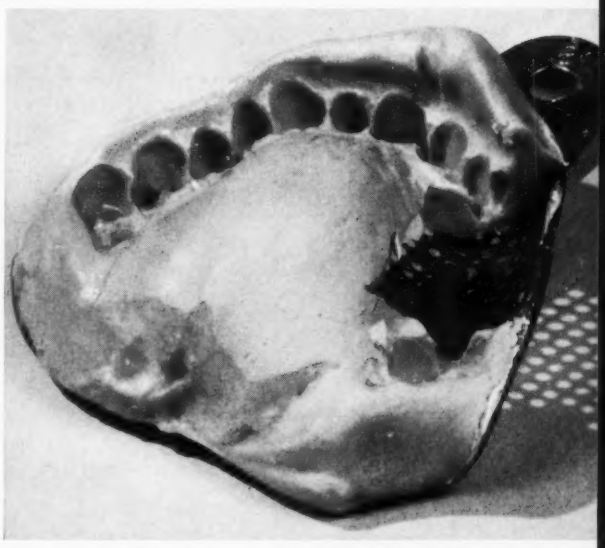

Figure 2 Alginate impression. Bridge area has been removed with a knife

serve as vehicles for these materials afford anchorage mechanically, either by perforations or rim locks. Anchorage can also be achieved by use of an adhesive. The adhesive gives the best uniform anchorage. The closely spaced perforations give the next best anchorage and the rim-lock type gives the least anchorage of the three.

In the following example bilateral consideration has been given to the construction of a unilateral fixed bridge. In this way the pontic, or pontics, can be placed and arranged according to the dictates of esthetics and function.

A shallow perforated tray of the type used for impressions of edentulous mouths is used (Fig. 1). This type of tray holds enough material to

Figure 3 Independent anchorage for the alginate and rubber base material

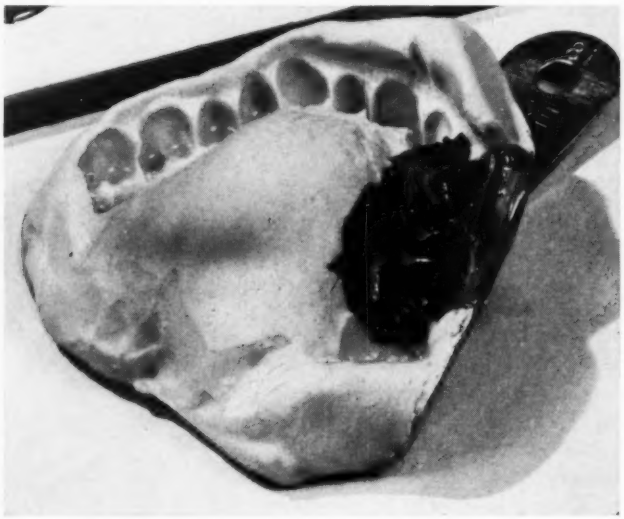

Figure 4 Completed impression showing the complementary use of alginate and rubber base material

Figure 5 (Below) Hydrocal model and dies of a hard stone. Figure 6 (Right) Articulated models showing bilateral treatment in the construction of a unilateral bridge. Fixed bridge can now be constructed

give an impression of the teeth and the immediate supporting structures and it is shallow enough to assure complete seating in the mouth.

The alginate is mixed and placed in the tray. The tray is inserted in the mouth and seated until the cusps of the teeth contact the metal tray. The optional use of compound stops, as shown in Figure 1, is suggested. A positive stop is necessary because without it distortion in the alginate would introduce an error when the impression is reseated in the mouth. When the alginate is set, the tray is removed from the mouth. The part of the impression in the bridge area (Fig. 2) is removed from the tray with a knife. All of the alginate, including that in the anchorage holes, is cleaned from the bridge area. This is done so the polysulfide rubber can anchor itself directly to the tray (Fig. 3). A heavy rubber, an injection type rubber, or a combination of the two, may be used. It is mixed according to the manufacturer's directions. To lessen the possibility of trapping air in the impression, a syringe is used to place the impression material on the abutment teeth.

The impression (Fig. 4) is poured immediately. Keyed dowels are used in reproducing the abutment teeth. The abutment teeth are poured of a hard die stone. A separating medium is applied to this stone and the rest of the impression is poured of Hydrocal (Fig. 5). This model is mounted on an articulator with a Hydrocal model of the opposite arch (Fig. 6).

Dental Compound Technic

A second impression taking technic employs dental compound and polysulfide rubber. A shallow stock tray again is used, but this time one without perforations. The compound is heated in a water bath then placed in the tray. A two-by-two-inch surgical sponge is moistened and placed over the bridge area (Fig. 7). The tray is inserted in the patient's mouth and seated. Before the compound has hardened the impression is removed and reseated several times to overcome the undercut areas. The tray is then taken from the mouth and the sponge removed from the tray. The compound will be rough where it contacted the sponge. This rough surface serves as a relief space to accommodate the polysulfide rubber. Before the compound has achieved its final set,

Figure 7 Softened compound with a two by two sponge on the bridge area to provide relief space

Figure 8 Compound impression showing the relief and anchorage for the reception of the rubber material

Figure 9 Completed combination impression showing the dental compound with the polysulfide rubber

Figure 10 Tray formed directly in the mouth

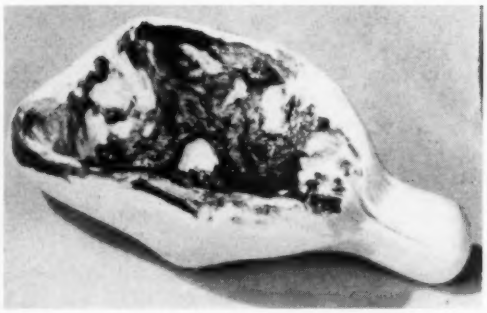

Figure 11 Individualized tray with butyl rubber adhesive is ready for impression material

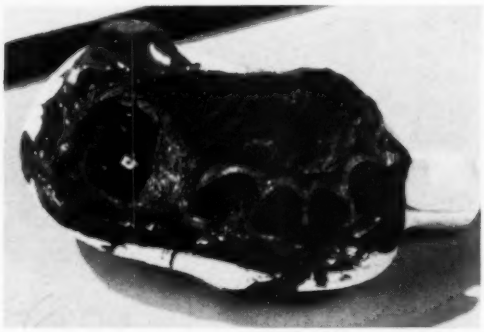

Figure 12 (Right) Completed rubber impression

anchorage holes should be made in the bridge area with a spoon excavator or similar instrument (Fig. 8).

A small amount of butyl rubber adhesive may be used to give further anchorage to the polysulfide rubber. Care must be taken with this adhesive because it contains an organic solvent which will attack the compound. The butyl rubber adhesive should not be used directly in the abutment areas.

The rubber material is mixed according to the manufacturer's directions. The rubber is introduced into the impression and the impression reseated in the mouth. When set, the impression (Fig. 9) is removed and poured immediately. The model is mounted on an articulator.

Plastic Tray Technic

When conditions permit a unilateral approach to the bridge construction, a third possible technic is suggested.

Before any preparations are made on the teeth, a tray is made directly in the patient's mouth. The operator spreads a thin film of petroleum jelly or hand cream on his hands to prevent the plastic from adhering to them. A fast polymerizing plastic tray material is mixed in a glass jar or paper cup. When the material reaches a heavy doughy stage, it is manipulated into a shape roughly resembling a tray and handle. This tray is inserted in the patient's mouth (Fig. 10) and adapted to it. Before the heat of polymerization sets in, the tray is removed and reseated several times to overcome the undercut areas. The patient's mouth is then flushed with water to eliminate any free monomer remaining there. No allergic reactions to the monomer were observed when this technic was used. Because the tray is removed from the mouth before the heat of polymerization sets in, no physical burning is possible.

The loss of tooth structure sustained in the preparation of the abutment teeth provides the relief space necessary for the polysulfide rubber. If a greater relief than this is desired, the abutment teeth may be covered with wet asbestos

paper before the tray is constructed. The inside of the tray is coated with butyl rubber adhesive and allowed to stand while the rubber impression material is being mixed (Fig. 11).

The tray is filled with the rubber impression material and inserted in the mouth. The models should be poured immediately, or within a reasonable length of time (three hours) after the impression (Fig. 12) is removed from the mouth. The prepared tooth, or teeth, is reproduced in a hard die stone attached to a keyed dowel. The remainder of the impression is reproduced in Hydrocal. This model is articulated with a stone model of the antagonist teeth of the opposite arch. The subsequent steps in the bridge construction may now be completed.

Summary

The advantages of using the materials and the technics described here can be evaluated readily. The shelf life of the polysulfide rubber is, of course, most important. The general practitioner cannot estimate how often he will have to use a particular material. The availability of the materials discussed in this paper makes them desirable for general office use. The dentist has only to handle the material at the moment he needs it. The three impression taking technics described in this paper are comparatively simple and can be performed with or without the help of an assistant.

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Endodontics

Pulp testing: an evaluation of various technics

Paul P. Taylor. *J.Den.Children* 27:107-112 July 1960

The vitality of the human dental pulp does not seem to be a physiologic phenomenon that can be measured precisely. The four methods of pulpal testing that have been used are thermal, mechanical, electrical and physiometric.

Thermal testing of the dental pulp is accomplished by the application of heat or cold. Cold usually is applied to the tooth either by the use of ice or a pledget of cotton sprayed with ethyl chloride until ice is formed. If mechanical refrigeration is available, ice cones may be prepared by trimming about two inches off the wide end of a cone-shaped cup and leaving a pointed paper cone that will fit into the cube compartment of a standard refrigerator tray. These cones, filled with water, are placed in the tray until the water freezes. To prepare the ice cone for use, the paper is torn off the point and the wide end is wrapped in soft paper. Ice is a material all patients are familiar with; hence, its application does not cause fear or anxiety. No preparation of the teeth is necessary, and the teeth need not be dry or clean. The use of ice consumes little time. It is especially useful in testing dental pulp in children.

To apply heat to the tooth, a piece of gutta-percha 2 to 3 mm. in diameter is fastened to the plugging end of a Woodson no. 3 plastic instrument or any other plugger of similar size and shape. The gutta-percha is passed through a gas flame until it is heated evenly and softened throughout. It is immediately applied to the tooth. Teeth which react strongly to cold also should be tested by application of heat.

Thermal testing of pulps has two disadvantages: (1) it is difficult to tell how cold the tooth becomes, and (2) standardized devices of measuring that will provide the same reading at two different appointments have not been developed.

The mechanical method of pulpal testing is utilized by preparing a cavity in a tooth as a test. It may be the beginning of a routine preparation for a needed restoration or it may be a small gingival cavity prepared exclusively for determining pulpal vitality. This method also has no measuring device to correlate results with readings from one appointment to the next.

Standardization of readings is more readily obtainable in electrical testing of dental pulp. Reiss and Furedi (1933) asserted that the simplest and most satisfactory device was one having a single-prong electrode, small enough to be applied conveniently to any surface of a tooth. The other electrode consists of a metal cylinder which the patient clasps in either one or both hands, after removing rings from his fingers. Both electrodes extend by wires from a small rheostat marked from 0 to 100 with a control or potentiometer that can be moved easily to raise the voltage as slowly as desired. The greatest disadvantage of electrical pulpal testing seems to be the psychologic effect it may exert on the patient.

Physiometric pulpal testing is one of the newer methods and has not been completely developed yet. One type provides a measurement of temperature within the pulpal tissue. The other embodies a photographic technic for measuring the circulation inside the tooth. The first type is based on an electronic device with thermistors which record changes of temperatures as slight as 0.0005°C. Preliminary findings in acute irritations of the pulp indicate that a rise in temperature occurs in the affected tooth. The photographic technic utilizes a photocell to demonstrate dynamic processes in the pulp of an intact tooth. This method of checking offers possibilities but requires more investigation to develop a practical technic.

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Periodontics

A new approach in oral physiotherapy

Jack Diener. *J.Dist.Columbia D.Soc.* 35:8-10 June 1960

One reason the dentist has not shown greater interest in the treatment of periodontal disease is that his efforts are often negated by failure of the patient to cooperate with the proper supporting oral physiotherapy at home.

A gum brush (see illustration) has been designed by the author for home use by the patient, in conjunction with a compound containing zinc complexes, benzalkonium chloride, eugenol and methyl salicylate in a glycerite base.

The home treatment has been used by 1,000 patients with no adverse effects.

The reversible, neoprene brush has 30 small fingers or stimulators. When the brush is placed on the labial surfaces of the teeth and pressed lingually, the fingers enter into three to five interdental spaces at one time. The contact points of the teeth force the stimulators and interproximal tissue apically. The brush or massager is rocked mesially and distally about one-quarter of an inch as the stimulators are kept in the interproximal spaces. The stimulators are rolled apically to massage the periodontal tissues. This provides a simple, efficient and rapid technic for interdental massage, a technic which is easily learned by the patient. The gingival tissue is massaged in the same direction that food acts on it—apically. The head of the brush then is moved to the adjoining portion of the dental arch, and the process continued, until the entire labial interproximal areas are stimulated. Lingual massage is not as simple, but can be accomplished without the stabbing effect of sharp bristles.

As long as bleeding, tenderness, poor oral hygiene or periodontal disease are present, the gum brush and medicament replace the toothbrush and dentifrice.

The 30 small fingers of the gum brush are pressed firmly into the interproximal area. The brush is rocked anteriorly and posteriorly as the fingers are kept in the interproximal spaces. The brush head is rolled apically

When the gum brush and chemotherapeutic adjunct were used in home oral physiotherapy by cooperative patients, the following benefits were observed: (1) reduction in gingival inflammation and congestion, and improved tone and texture of the tissues; (2) diminished bleeding and tenderness of the gingivae; (3) decrease in pocket depth; (4) desensitization of exposed cervical areas of the teeth, especially after gingivectomy; (5) acceleration of restoration of tissue to normal state after gingivectomy; (6) less tissue hyperplasia after gingivectomy, and (7) psychologically beneficial attitude for improved oral hygiene.

No unfavorable or allergic reactions have been noted in any patient.

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Comparative studies in periodontal disease

B. Cohen. *Proc.Roy.Soc.Med.* 53:275-280 April 1960

In 1959, the author suggested that periodontal disease in its most destructive form develops as a consequence of chronic ulceration in the interdental area. The reason for the extreme susceptibility of this area to periodontal disease is that between teeth which erupt in contact, the interdental septum has the form of a col, the surface of which is covered by nothing more than a juxtaposition of the interproximal reduced enamel

epithelia of the adjacent teeth. [Webster defines col as "a pass between adjacent peaks in a mountain chain."] This enamel epithelium, being a vestigial tissue whose primary function has been discharged, is ill-fitted to act as an outer protective integument since it possesses neither the capacity for keratinization nor the ability to proliferate rapidly and extensively, both of which features are characteristic of stratified squamous epithelium.

In this study an attempt was made to determine whether the incidence of periodontal damage in laboratory rats was related to the constitution of the diet. Thirty-six rats from six litters were divided into two groups. The control group was fed on normal laboratory diet consisting of tubular pellets, ¾ inch in diameter, composed in the main of wheat meal and ground oats with the addition of necessary vitamin supplements, and compounded into a form requiring considerable gnawing and mastication. The experimental group was fed on a diet devoid of sharp particles: the diet consisted of rindless cheese, soft bread, shelled hard-boiled egg, raw carrot, raw cabbage and cooked horseflesh.

The laboratory diet containing sharp particles affected the periodontium deleteriously and severe damage often was seen in young rats; some of the periodontal lesions were progressive, but superficial lesions apparently could be arrested, or at least slowed down, by the localizing action of the inflammatory process and by downgrowth of stratified squamous epithelium. Rats maintained on a diet free of mechanically irritant particles were far less prone to early damage; in older animals, minor ulcerations and varying degrees of periodontal inflammation were associated with the accumulation of food debris around the teeth and the impaction of hair in the soft tissues.

The distinction between hard foods and injurious elements should not be overlooked. The better periodontal state of the rats on bland food is attributable not to the soft nature of their diet but to the absence of sharp particles. Indeed, the deleterious effects of soft constituents became apparent in later age groups, where the accumulation of food debris around the teeth was considerably less in the control rats. Presumably, the mastication of coarse food had the effect of cleansing the tooth surfaces.

The application of these studies to clinical situations encountered in human subjects is clearly limited. Nevertheless, there is an implication of an origin of periodontal disease in epithelial inadequacy, as Fish (1935) originally suggested. The proximity of stratified squamous epithelium may well determine the course of events once an initial breach in the surface has been effected. So far as periodontal disease in human beings is concerned, the chance that such a breach may result from particulate matter in the diet is unlikely, in the event of an interdental origin, for two reasons: (1) the fact that the human diet normally is devoid of such particles, and (2) the interdental region normally is well-protected from the assaults of sharp spicules by the contact of two teeth above it.

In the absence of an obvious traumatic agent such as has been identified in laboratory rats, some other source of the initial interdental injury must be sought. It was surmised previously on the basis of histologic observations that a breach in the integrity of the oral epithelium must necessarily occur interdentally at the time of eruption of a tooth coming into contact with an adjacent neighboring tooth already present.

Observations of erupting teeth at a microscopic level lend support to the hypothesis that the eruption of contiguous teeth inevitably is associated with an interdental breach in the oral epithelial integument, and that this defect may constitute the site of initiation of a periodontal pocket.

If it is accepted that in the normal gingival crevice at least part of the surrounding epithelium is stratified squamous epithelium, it follows that the crevice does not extend into an interdental region denuded of oral epithelium during eruption. In view of the evidence suggesting that the presence or absence of oral epithelium is a factor of considerable prognostic significance, it may be useful to distinguish between lesions originating in the col and those originating in the crevice. It is the former type which is likely to take a rapid course, to progress intractably, and to develop into the clinical feature referred to as an intrabony pocket. In the crevicular variety, however, an initial lesion occurring at or near the confluence of oral and enamel epithelium may be inhibited from progressing by the

protective proliferation of oral epithelium. It is for this reason that periodontal disease originating in the gingival crevice is more readily amenable to treatment, and is likely to involve the deeper structures and the supporting bone only in those instances in which the normal tissue defense mechanism is deranged by gross neglect or by the presence of systemic disease.

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The periodontal space in roentgenograms

Pontus Lönberg. *Svensk tandläk.Tskr.* 53:477-500 June 1960

This investigation is a continuation of a previous study (1951) on the width of the periodontal space in roentgenograms of teeth of three types. The subjects were university students 22 to 24 years old. From oral roentgenograms, more than 3,000 measurements, graded in 1/10 mm., were made under magnification. The findings were as follows:

1. The width of the normal periodontal space in roentgenograms is, at the apex, 0.15 mm. for all teeth.

2. The lateral measurement, at one third of the root length from the apex, varies between 0.10 and 0.12 mm., with a mean of 0.11 mm.

3. The periodontal space, at two thirds of the root length from the apex, is greater than at one third of the root length. The average for the different teeth measured varied between 0.13 and 0.17 mm., with a mean of 0.15 mm.

4. A comparison between the mesial and the distal measurements, made at one third of the root length, did not show any significant variation (0.11 mm.). At two thirds of the root length from the apex, the measurement is about 9 per cent greater mesially than distally.

5. The mean of the combined measurements at two thirds of the root length tends to increase, the further back the tooth is situated in the mouth; that is, from 0.13 to 0.15 mm. in the upper jaw and from 0.15 to 0.16 mm. in the lower jaw.

Clinical experiments were conducted to ascertain whether the periodontal space appears to be equally wide when the central ray is focused mesial eccentrically, orthoradially and distal eccentrically on points situated two thirds of the root length from the apex. It was found that the teeth with the greatest width, that is, the lower incisors and the lower first molars, show the greatest variations. The periodontal space of both the lower incisors had, with orthoradial focus, a width of 0.16 and 0.15 mm. With an eccentric focus the width is reduced to 0.12 and 0.13 mm. For the upper second bicuspids, the width of the periodontal space is 0.15 mm. with both orthoradial focus and distal eccentric focus. The periodontal space of the lower molars is wider (0.16 mm.) with orthoradial focus than with eccentric focus (0.15 mm). The other teeth display no differences when orthoradial or eccentric focusing is employed.

The periodontal space, when focused both orthoradially and eccentrically, has a greater degree of density when it is wider than when it is narrower. Roentgenograms taken eccentrically show a lighter periodontal space than those taken orthoradially.

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Hydrocortisone (compound F) acetate ointment in the treatment of periodontal disease

Edoardo Colombo. *Riv.ital.stomat.* 15:489-496 May 1960

Topically applied hydrocortisone (compound F) acetate ointment was the agent of choice in the treatment of 25 patients with acute and subacute periodontal disease at the Dental Institute of the University of Milan, Italy.

Several different ointment bases were tested to incorporate satisfactorily the crystalline 17-hydroxycortisone-21-acetate into various concentrations.

In this study, hydrocortisone acetate ointment was found to be of definite value in the management of periodontal disease in instances where many other treatment methods had failed to obtain improvement. This fact was demonstrated by the eminently satisfactory results observed in 16 patients (66 per cent).

In the instances in which the response to treatment could be judged as favorable, improvement occurred within 48 hours to one week after initiat-

ing the hydrocortisone (compound F) acetate treatment. When the topical application of the hydrocortisone acetate ointment was discontinued, the beneficial effects wore off within four to five days, thereby proving that the hydrocortisone (compound F) acetate, and no other therapeutic agent had produced the beneficial effects.

The clinical technic of using this ointment is comparatively simple. It proved sufficient to massage the periodontal tissues gently two or three times daily to obtain a rapid decline of the symptoms. In the majority of instances, complete recovery was observed after from one to two weeks of treatment.

The hydrocortisone acetate ointment has no disagreeable taste, and its clinical use is a valuable adjunct to the management of periodontal disease resistant to customary treatment methods. The use of this agent offers obvious advantages over systemic application of cortisone and its derivatives, especially adrenocorticotropic hormone (ACTH). Although the new agent will not be as dramatic in producing the beneficial effects —as the results of this study have proved—the adverse reactions are apparently obviated.

Further studies, however, will be required to clarify the precise mechanisms by which the local therapeutic effects of the hydrocortisone (compound F) acetate ointment are achieved.

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Suppurative gingivitis

München.med.Wschr. 102:1642 Aug. 1960

Q.—Two months ago, a 24 year old woman appeared at my office for treatment of an extreme inflammation of the gingival margins causing pain, halitosis and purulent discharge. Initial treatment consisted of removal of calculus, thorough cleansing of the tooth surfaces and gingival pockets and application of a paste containing iodoform and glycerin. The acute inflammatory symptoms subsided and the disease appeared in its chronic form which proved to be resistant to treatment. The patient has a neutral bite with insignificant positional anomalies of the teeth. The patient's history reveals an attack of bronchial asthma in early childhood and a suspicion of anemia. The present clinical picture, however, shows, besides eosinophilia (increase of 4 per cent in eosinophil cells), and extreme anxiety, no other medical pathologic condition. Specimens obtained from the gingiva, stained with crystal violet, treated with a 1:15 dilution of Lugol's iodine, decolorized with ethanol and counterstained with safranin (Gram's method) showed a normal oral flora and the absence of any fusospirillary microorganisms. Clinically, the picture does not resemble thrush or an infection caused by *Candida albicans.* Is it possible that the suppurative gingivitis is caused by an allergic reaction similar to that experienced in bronchial asthma? What investigation and treatment procedures can be recommended?

A.—Because the questioner considers only the possibility of an allergic reaction of the gingival tissue to an undetermined allergen as causative factor of the suppurative gingivitis in his patient, it must be assumed that systemic causes such as avitaminosis, leukemia or intoxication as well as local causes such as infection or trauma had been thoroughly investigated, and that the findings were negative. Isolated symptoms such as inflammatory reddening of the oral mucosa, slight hemorrhages, formation of blisters or nodules, eczema and herpes may combine to form the syndrome, periodontal diseases, manifested by gingivitis, glossitis and stomatitis. The main causative factors of this syndrome are nutritional antigens, dentifrices, dental materials or denture-cleaning agents (can be discarded in this instance), cosmetics and drugs. A possible allergen common in causing suppurative gingivitis and bronchial asthma is salicyl or its derivatives. Habitual intake of drugs containing salicylic acid or of food substances treated with this acid for preservation may cause the described symptoms. However, it will be necessary to perform intracutaneous, epicutaneous and epimucous antigen analyses to establish an allergic pathogenesis. Treatment may consist of administration of estradiol benzoate, adrenocorticotrophic hormone, vitamins A and D and androsterone. However, the patient should be treated for the anxiety primarily and for the oral lesions secondarily.

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Extractions

Removal of malposed lower third molars

Günter Schuhmacher. *Bl.Zahnhk.,Zürich* 21:104-105 June 1960

Extraction of lower third molars should not be attempted unless roentgenographic examinations have revealed that neither the third nor the second molar is malposed. Even a seemingly insignificant distal or mesial tilting of the tooth may cause an abnormal position of the cusps and roots (generally beneath the crown of the second molar). In such instances, the malposed tooth will not yield to the pressure exerted by forceps or elevators. Interpretation of the roentgenogram will provide the basis for the necessary surgical removal and will decrease the hazard of post-operative complications. In the treatment planing, the sectional elimination of the malposed lower third molar should always be considered.

During surgical removal of malposed teeth, the entire tooth or its fragments may be aspirated, swallowed or lodged in the maxillary sinus. Another serious complication is the penetration of tooth fragments in the floor of the mouth. Immediate surgical removal of malposed lower third molars—not routine extraction—is, therefore, the method of choice. Severe positional anomalies in lower third molars can be classified as:

1. Horizontal mesioversion: the axis of the third molar and the axis of the second molar form a right angle (Fig. 1).
2. Inclined mesioversion: the crown of the third molar is tilted anteriorly. Its axis and the axis of the second molar form an angle of about 45 degrees (Fig. 2).
3. Infraversion: the axis of the third molar and the axis of the second molar lie parallel but the crown of the third molar lies beneath the plane of occlusion so that only the cusps appear above the alveolar bone (Fig. 3).
4. Distoversion: the crown of the third molar is tilted distally (Fig. 4).
5. Buccoversion: the crown of the third molar is tilted buccally. The axis is nearly horizontal (Fig. 5).
6. Linguoversion: the crown of the third molar is tilted lingually, but the axis is almost horizontal.

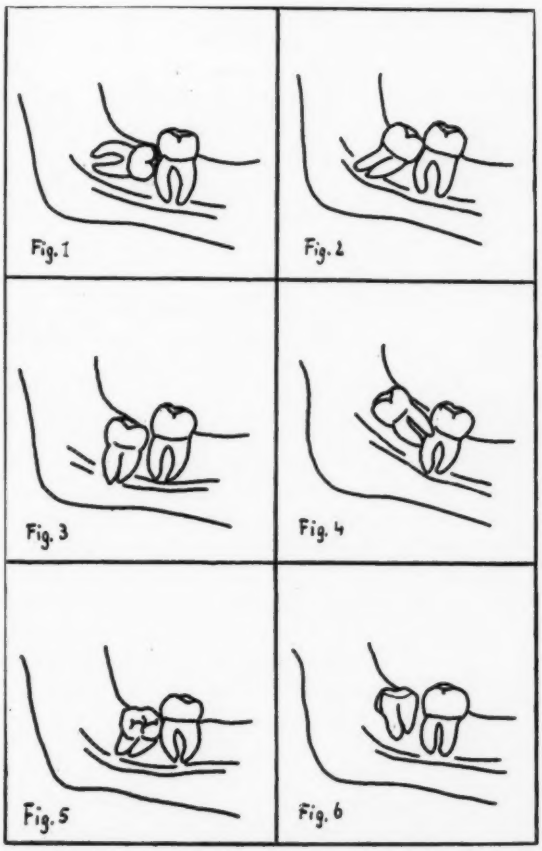

Figure 1 *Horizontal mesioversion*

Figure 2 *Inclined mesioversion*

Figure 3 *Infraversion*

Figure 4 *Distoversion*

Figure 5 *Buccoversion*

Figure 6 *Linguoversion*

Many variations, modifications and combinations of these positional anomalies of the lower third molars have been observed.

Surgical removal of a malposed lower third molar should be performed under local anesthesia. For the six types of positional anomalies the following surgical technics are recommended:

1. Horizontal mesioversion: a wedgeshaped incision is made from the tip of the roots to the border of the ascending ramus. The triangle of bone is removed and a groove is drilled into the lower side of the tooth. The groove will be used as a point of application for the elevator or for the chisel if sectional removal is indicated.

2. Inclined mesioversion: the buccal and distal portions of the crowns are exposed. If it is difficult to section the tooth distally because of the presence of a tightly wedged mesial cusp, a diamond disk should be used to separate the tooth vertically. Both fragments can be removed without difficulty.

3. Infraversion: the crown is exposed by a circular incision extending on the buccal side from the crown to the bifurcation. The elevator is inserted in this exposed surface and the tooth gradually removed.

4. Distoversion: a vertical incision is made in the soft tissue immediately distal to the crown. Another is made near the second molar. The two incisions are joined by a mesiodistal incision above the ridge and the tissue retracted.

5. Buccoversion: the crown is completely exposed and a suitable point for the application of the elevator created.

6. Linguoversion: the same principle used in buccoversion is applied.

In most instances, a malposed lower third molar can be removed intact. If it is desired to section the tooth, the use of an osteotome is recommended.

After completion of the surgical intervention, including suturing, a compress of sterile gauze should be placed over the entire surgical area to ensure postoperative hemostasis.

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Hemophiliac patients at the dental office

G. Landbeck. *Med.Welt* 60:295-304 June 1960

Patients with diagnosed hemophilia A or B are sometimes seen at the dental office.

Hemophilia A is characterized by impaired blood coagulation, attributed to deficiency in the plasma of effective thromboplastinogen, that is, factor VIII.

Hemophilia B, often associated with Christmas disease, is caused by hereditary deficiency in factor IX. Recent studies have revealed that there are also combined forms, pseudohemophilia and parahemophilia, both caused by congenital factors.

Prerequisite of any dental procedure performed in hemophiliac patients is the normalization of blood coagulation, because even the slightest injury may result in uncontrollable hemorrhages which in many instances are fatal. Transfusion of fresh and normal blood or plasma must be initiated to reduce the coagulation time before any dental procedure can be performed.

When extractions of deciduous teeth in hemophiliac boys are required, only one tooth should be extracted at a session. The wounds must be tamponed immediately with fibrin foam. The transfusions must be continued postoperatively for a comparatively short period (between 12 and 24 hours).

Permanent teeth in a hemophiliac patient should be extracted only after the dentist has been assured by the patient's physician (not by the patient himself) that transfusions have been administered and the coagulation time appears as normal. The same procedures—one tooth at a session—must be applied, and postoperative transfusions continued for a longer period (between 24 to 48 hours).

If the hypoprothrombinemia is arrested, slight bleeding during and after tooth extraction is not dangerous.

In patients in whom the dentist suspects the presence of hemophilia, blood samples should never be taken from oral or nasal tissues or from the lobe of the ear.

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Prosthetic dentistry

Resilient liners for dentures

E. A. Travaglini, P. Gibbons and R. G. Craig. *J.Pros.Den.* 10:664-672 July-Aug. 1960

Resilient liners for dentures are used with the hope of minimizing pressure and reducing trauma to the supporting tissues without sacrificing contact. Many physical and clinical tests are necessary to evaluate resilient liners. This is a preliminary investigation of ten resilient liners tested for two physical properties: (1) the initial hardness of the liners, and (2) the changes in hardness and weight of these liners when stored in water at room temperatures.

The ten materials tested were Flexene, Dura Base, Justi Treatment Reliner, Soft Oryl, Soft Line (Amco), Plialite, Verno-Soft, Nelson's Soft Lining, Silyne, and Softline (Kerr).

The liner materials are so soft and flexible that hardness tests such as the Rockwell and Knoop tests do not give satisfactory results. Therefore, another testing method was employed.

The Shore A Durometer is used in the rubber industry to determine the relative hardness of elastic materials. This instrument consists of a blunt-pointed indenter 1/32 inch in diameter which tapers to a 1/16 inch cylinder over a distance of 1/16 inch. The indenter is attached to a scale by a lever arrangement and reads from 0 to 100 Shore A hardness units. The more the indenter penetrates the specimen, the lower the hardness value is.

The specimens, 2 mm. thick, were placed on a glass slab during testing. Ordinary heat-cured poly(methyl methacrylate) on this scale has a hardness of 99, whereas the resilient liners had hardness values ranging from 20 to 91.

The major portion of the change in hardness in all materials took place within the first four weeks. On the basis of their final hardness after storage in water, the resilient liners may be classified into two groups. The first group includes Nelson's Soft Lining, Soft Line, Softline, Dura Base, Silyne and Soft Oryl. This group of materials has hardness values between 50 and 65 Shore A units. The second group consists of Verno-Soft, Plialite, Flexene and Justi Treatment Reliner. These materials have hardness values between 84 and 89 Shore A units. Both groups, however, consist of softer materials than heat-cured acrylic resins.

On the basis of weight change after storage in distilled water, the liners may be classified into three main groups. The weight change values, which are an indication of dimensional stability, show that none of the liners is stable and indicate that dimensional changes would be expected. The most satisfactory materials with respect to weight changes are Soft Line and Soft Oryl.

None of the materials tested presented any curing problems.

A number of other physical and clinical properties should be measured in order to evaluate a resilient liner.

The polishing and finishing characteristics of the resilient liners are of considerable concern. Even the softer plastic materials may be polished and finished by storing in ice-cold water just prior to performing these procedures.

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The use of Duralumin-type alloys in constructing skeleton partial dentures

Joseph Ryan. *J.D.A.South Africa* 15:245-256 Aug. 1960

The dental profession probably is prejudiced against the use of aluminum for dentures because of the failure of many aluminum dentures constructed in the past. Twenty-five years ago, corrosion was found to be the main cause of failure of aluminum dentures, particularly the form of corrosion resulting from electrolytic action caused by impurities within the matrix of the metal.

The problem of electrolytic corrosion of aluminum has been solved through the efforts of metallurgists who have produced an aluminum of superpurity (up to 99.99 per cent pure). This metal can be combined with other base metals to produce alloys which are largely, if not entirely,

free from electrolytic corrosion. The impetus for most of this work has come from the needs of the aircraft industry.

Through the cooperation of the Department of Metallurgy of the University of the Witwatersrand, a supply of one of the strongest of the new aluminum alloys—Duralumin K—was made available. These alloys have the general formula of zinc 6 per cent, magnesium 2.5 per cent, copper 1.0 to 1.25 per cent and aluminum 90.25 to 90.5 per cent.

Over recent years many patients have been provided with skeleton partial dentures made of Duralumin K at a minimal extra cost to that of plastic dentures. It can be presumed that other alloys which fulfill the specification DTD682A of the British Ministry of Supply for aircraft construction would obtain similar results in partial denture construction.

The ultimate tensile strength of Duralumin K in extruded bar form is over 40 tons per square inch, and this compares favorably with the strengths of the more commonly used dental metals.

The secret of obtaining great strength in these aluminum alloys lies in the ability to produce a fine-grained casting. Essentials of the casting technic include the use of centrifugal casting, the addition of grain refiners or nucleants in the form of suitable chemicals to the molten alloy, the addition of degassers to the mixture, and rapid chilling of the casting.

The standard wax procedure has been employed, using the typical cristobalite model and investing materials. Investment models are prepared by the customary direct casting technic. Designs should be kept as simple as possible. When partial dentures are cast in gold or cobalt-chrome alloy, it is customary to make the saddles a mere skeleton framework around which the acrylic resin can flow; this is done mainly to economize when working in gold, and to reduce finishing time when working with cobalt-chrome alloys. With Duralumin K there is neither need to economize nor to save time, so that the saddle can be waxed down to the model directly, giving the finished saddle a metal-to-mucosa contact with all possible advantages. Further, these designs enable the junction of saddle and connecting bar to be made stronger, thus avoiding the risk of fracture at such notoriously weak spots.

Spruing follows the usual rules, and investing is standard, alcohol or a detergent being used to reduce surface tension before applying the fine investment. A Kerr Centrifugo machine, with a removable crucible which can be placed in the furnace for preheating, is used for casting. The Duralumin K denture is anodized by placing it in a dilute acid bath; the denture is firmly attached to an aluminum jig, and a current of electricity at a voltage of 10 to 12 volts and an amperage of 0.1 ampere per square inch of metal surface is passed through the electrolyte (8 per cent sulfuric acid) for half an hour.

The use of Duralumin K can be recommended to the profession as an alternative metal for skeleton dentures. It is not the intent of the author to suggest that dentures of high-strength aluminum alloys can supersede dentures of gold or chrome-cobalt, only that dentures of the new aluminum alloys can provide an excellent substitute where expense has to be considered.

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Orthodontics

Expansion as a treatment procedure—where does it stand today?

Ashley Howes. *Am.J.Orthodont.* 46:515-534 July 1960

In orthodontics, expansion refers to lateral enlargement of the dental arches by orthodontic forces, either direct or indirect. In the United States, the status of expansion of the dental arches as a treatment procedure has changed greatly in the past 15 years. Many orthodontists say they have discarded expansion as a part of orthodontic therapy, and most of the latest orthodontic textbooks do not mention expansion.

One reason for the change in viewpoint is that dentists saw that the dentitions of former patients whose arches had been expanded, or in whom intermaxillary elastics had been used, had collapsed. A principal reason for the collapse was inadequate basal bone for the existing amount of tooth material. Teeth never should be tipped buccally or labially beyond the limits of their normal relationship with supporting bone.

Nevertheless, lateral enlargement of the coronal arches has not been given a fair trial. Expansion therapy should be used, not as a panacea, but in selected patients with dentitions in the mixed stage, since at this period the mandibular arch from the distal surface of the first molars forward is longer than at any other future time in life.

European orthodontists appear to regard large amounts of expansion in treatment as routine. Walter, after measuring the casts of 102 persons who had undergone orthodontic treatment, reported (1953) "the statement that the dental arch cannot be permanently widened, or lengthened, is incorrect."

Among the favorable factors which enter into a decision to expand the dental arch at the stage of mixed dentition are the following:

1. Good facial pattern, or one with good potential as evidenced by cephalometric roentgenograms. A Frankfort-mandibular plane angle of less than 28 degrees is particularly important.

2. Good basal arch width, wider than coronal arch width.

3. Good bizygomatic and bigonial width in regard to the patient's age, or the presence of exceptionally long arches.

4. Parents with good arch width and with only moderate, if any, crowding of mandibular incisors.

5. Well developed arches in one or more siblings.

6. Well formed teeth with little, if any, decay.

7. Good muscular balance in Class I malocclusion.

8. Not more than 89 mm. of mandibular tooth material and 98 mm. of maxillary tooth material, from first molar to first molar, inclusive. Sizes of the unerupted permanent teeth must be ascertained from roentgenograms.

9. Good arch length which has not been reduced by premature extraction of a deciduous second molar.

10. Favorable leeway space, preferably 3 mm. or more on each side.

11. Mandibular incisors which, although crowded, are not severely rotated.

12. A cooperative child who will wear an extraoral appliance. Generally, the younger children fuss less about this than the older children.

Contraindications for early expansion would be the reverse of the afore-mentioned conditions.

In patients in whom expansion definitely is contraindicated, serial extraction may minimize treatment problems.

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Operative dentistry

Changes in dentine during cavity preparation using turbine handpieces

Ivor R. H. Kramer. *Brit.D.J.* 109:59-64 July 19, 1960

During the histologic examination of sections of teeth in which cavities had been prepared with turbine handpieces, it was noted that, in addition to pulpal changes, some sections showed changes in the dentin bordering the cavity. These changes in dentin do not appear to have been described previously. They may be of importance as indications of heat production during cutting.

In noncarious teeth (usually bicuspids to be extracted for orthodontic purposes), cavities were prepared on the buccal or lingual aspect in the cervical third of the crown. Borden Airotor handpieces were used, with a rotary speed of about 320,000 rpm, under an operating load of 2 to 2.5 oz. Cavities were prepared with cylindrical diamond points or with tungsten carbide burs, and with or without water spray. At various intervals after filling, the teeth were extracted and sectioned. The sections were stained with hematoxylin-eosin and examined.

Sections of teeth in which cavities have been prepared under water spray at conventional speeds (4,000 to 8,000 rpm) rarely show changes in the dentin forming the cavity floor and walls.

In this investigation, dentinal changes were of two main types, designated "burning" and "darkening."

In some sections, part of the dentin next to the cavity appeared to be dissolved (Fig. 1). The cut edge of the tissue was indistinct, and in a zone up to 30 microns deep the dentin matrix stained pale blue in hematoxylin-eosin preparations, as compared with the deep red-purple of the rest of the dentin. Associated with this change in staining properties was a swelling of the matrix substances in the affected zone, so that the cut surface of the dentin became "pleated." Occasionally, the affected area also showed dilatation of the dentinal tubules with the development of fusiform or rounded spaces (Fig. 2). These changes provisionally were termed "burning" of the dentin.

It was further noted that, in some sections, the dentin near the cavity stained more deeply in hematoxylin-eosin than the dentin further from the cavity (Fig. 3). This altered staining, provisionally termed "darkening," often was present beneath the zone of gross change already described, but in many sections the darker staining was the only dentinal change observed.

A modification of Masson's trichrome stain and the Perdrau modification of the Gomori silver im-

Figure 1 Section from floor of cavity prepared with a turbine handpiece and a carbide bur, without water spray. The dentin near the cut surface stains weakly with hematoxylin-eosin and appears swollen

Figure 2 Section from cavity prepared as described in Figure 1. The dentin matrix stains weakly and appears swollen. Some dentinal tubules are dilated and occasional rounded spaces are present

pregnation technic were used to investigate further the changes in the dentin. These methods provided further evidence that the collagenous matrix had been altered.

By the application of a heated bur to exposed dentin in freshly extracted teeth, similar morphologic changes and alterations in the staining reactions of the dentin were produced.

When the incidence of the changes was related to the method of cavity preparation, it was found that:

1. "Burning" was present in none of the sections of teeth in which cavities were cut at conventional speeds and in a few sections of teeth after cavity preparation with turbine handpieces and water spray.

2. After the use of the turbine handpiece without water spray, a fourth of the teeth cut with diamond cylinders and more than half of the teeth cut with carbide fissure burs showed "burning" of the dentin.

3. "Darkening" occurred in 8 per cent of the sections of teeth with cavities cut at conventional speeds. When turbine handpieces were used, the incidence was much higher—diamond cylinders with water spray, 28 per cent; carbide burs with water spray, 50 per cent; diamond cylinders dry, 80 per cent, and carbide burs dry, 84 per cent.

The changes in the dentin sometimes were confined to two areas, the central part of the cavity floor and the dentin near the dentinoenamel junction.

Figure 3 Section from floor of cavity prepared with a turbine handpiece and a diamond cylinder, with water spray. A band of dentin next to the cut surface stains more deeply with hematoxylin-eosin

It is concluded that the changes described are due to heat generated during cavity preparation. Although other studies, not yet reported, indicate that the pulp usually escapes serious damage if a water spray is used, the possibility that heating causes increased fragility of the enamel at the margin of the cavity merits further investigation.

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Study of influences of amalgam trituration upon corrosion

Hiroyoshi Habu. *J.Nihon Univ.School Den.* 2:127-130 March 1960

Amalgam alloy was triturated and condensed by five different technics, and the corrosive tendency traced in terms of electric current curves recorded by the polarograph. (In 1922, Jaroslow Heyrovsky of Czechoslovakia invented polarography as a means of electrolysis in which the mercury dripping electrode is used; in 1925, Heyrovsky and Shikata, of Kyoto University, Japan, produced a recording instrument to trace the electric current curves of polarography.)

The ratio 1:1.1 for alloy and mercury was used in all specimens. In specimen A, trituration was by mortar and pestle, time was 60 seconds, and condensation was done by hand. In specimen B, trituration was by mortar and pestle, time was 60 seconds, and condensation was done mechanically. In specimen C, trituration was carried out mechanically in 30 seconds, and condensation was done by hand. In specimen D, trituration was carried out mechanically in 30 seconds (amalgamator A), and condensation was done mechanically. In specimen E, trituration was carried out mechanically in 30 seconds (amalgamator B), and condensation was done mechanically. Two samples of each specimen were placed in Petri dishes each containing 2 cc. of artificial saliva at pH 6.8, and the corrosion currents were measured after the specimens had been immersed in the saliva for 60 seconds.

The least corrosion was recorded for specimen E. In ascending order of corrosion, the other specimens ranked D, B, A and C.

In attempting to prevent corrosion of amalgam, the best results will be obtained by using some

mechanical means of trituration and condensation.

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A new approach to porcelain inlays

Eric K. Joseph. *D.Practitioner* 10:263-266 Aug. 1960

The problem of making esthetic and permanent restorations in anterior teeth remains unsolved. Translucent cements give poor results unless prepared under the most rigid conditions, and self-curing acrylic resins have proved a disappointment. A new method, utilizing fused porcelain, requires a minimum of chairside time. The method can be used to restore multiple cervical cavities, Class I, Class II and Class IV cavities, and to replace fractured porcelain facings without having to remove bridges or crowns.

To restore multiple cervical cavities, the impression of these cavities is taken with silicone rubber material in a prepared tray, and a model is cast in refractory investment compound. The porcelain inlays are baked directly in this model.

Because of the relatively low tensile strength and edge strength of porcelain, the cavities should be prepared in such a way as to provide for sufficient bulk of material to resist fracture, and should have no marginal bevel.

As many as six cervical cavities may be prepared at one time. The cavities must be clearly and completely defined in the impression. The impression tray can be made by doubling a strip of expanded metal and contouring it to the desired shape. This shape is held rigid by applying a coat of self-curing acrylic resin to the outer layer of metal. The cavities are dried so that the impression material will adhere to them. They are filled individually with a syringe, care being taken to avoid trapping air. The remainder of the material in the syringe is used to overlay the whole area. The tray is placed in position and held there until the material has set.

The thickest mix of investment powder and distilled water which can be vibrated into the mold should be used. This puttylike mix can be encouraged to flow by directing it with a fine-pointed camel's-hair brush. When the model has set for at least 30 minutes, the impression is removed. A stone or copper-plated model may be made from the original impression; such a model is useful for finishing the inlays and for presenting them at the chairside.

The inlays are baked in low-fusing porcelain (980°C.) in a small furnace. To control shrinkage, the inlays are baked in three stages. The model first is soaked in distilled water, and a wet mix of porcelain powder is carried over the floor of the cavities and dried out. The model is then baked to the biscuit stage, when it will be seen that the porcelain has fused into a solid mass with a mat surface. After the model has cooled it is again soaked, and porcelain is built up to the margins of the cavities. The work is slowly replaced in the furnace and again baked to the biscuit stage. The third baking is carried out when the cavities have been slightly overfilled in order to provide contour to the inlays, and the inlays are baked until they have a glazed surface.

The inlay can be handled by attaching it to a probe by means of a bead of sticky wax. The floor and walls of the cavity and the fitting surface of the inlay are painted with a thin mix of cement and the inlay is placed and pressed firmly home with a wooden stick. Inlays prepared by this method fit so accurately that if the cement is mixed too thickly, or if too much cement is inserted into the cavity, difficulty will be encountered in pressing the inlay into position in the patient's mouth.

To avoid the unsightly appearance of oxyphosphate cement, a translucent cement is used. Once the inlay is in position, the excess cement should be removed before it has set, and the edges of the inlay should be covered with grease. When the cement has hardened, the whole area should be protected with a coat of varnish, and no attempt should be made to finish the work until the next visit. The edges then should require only the slightest disking and polishing.

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Isolated lichen ruber planus of the oral mucosa

Michel Dechaume and J. Payen.
Ann.odontostomat.,Lyon 17:85-88
March-April 1960

Lichen ruber planus is a chronic disease which in most instances affects both the skin and the mucous membranes. However, sometimes the oral mucosa alone is affected.

Isolated lichen ruber planus of the oral mucosa can be considered as a form of leukoplakia characterized by a network of white thickened lines appearing in various regions of the oral mucosa which occasionally exhibits a tendency to fissure and later to malignant change.

The often persistent wide and flat papules (lichens), associated with this specific form of the disease, seldom appear on the inner cheek, tongue or lips. This is the most important diagnostic difference between the disease and leukoplakia buccalis.

The erosive, sclerotic and hypertrophic lesions usually appear opposite the occlusal line of the teeth at sites sustaining the greatest amount of irritation, and are later distributed over the entire area of the oral mucosa.

This type of lichen ruber planus occurs most frequently in patients who show signs of nervous exhaustion from anxiety, grief, mental strain or overwork. It occurs rarely in children, and is most common in adults from 35 to 50 years old.

Fifty patients with the disease were observed at the Dental Clinic of the University of Paris, France. In five patients, a carcinomatous change had taken place prior to the initial examination.

Histopathologic findings revealed that in all 50 patients a dense inflammatory infiltrate was present which consisted mainly of lymphocytes and polymorphonuclear leukocytes. Gradually increasing edema occurred between the basal layer of the oral mucosa and the subepithelial infiltrate. In the five patients who had exhibited malignant changes, the lesions consisted of hypertrophic prickle and round cell layers.

Clinically, two different types of the disease could be distinguished: (1) an erosive or bullous form, and (2) a sclerotic, cicatrizing and hypertrophic form.

Treatment consists in removal of all mechanical irritating factors; recommendation of adequate oral hygiene, good food, vacation with lots of sunshine, and topical application of arsenic and mercury preparation. Acute lesions should be treated with methylene dichloride to prevent infection. A mouthwash containing 2 per cent chlortetracycline hydrochloride may be used. However, the lesions of isolated lichen ruber planus of the oral mucosa usually are resistant to any form of treatment.

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Oral manifestations of erythema exudativum multiforme maius

Walter A. Müller and Hermann Hartenstein.
Deut.med.Wschr. 85:879-882 May 13, 1960

Erythema exudativum multiforme affects mainly the skin but frequently other parts of the human body also may be involved. The term, erythema exudativum multiforme (major or minor) may serve as a collective designation for the manifestation of various diseases which, if accurately diagnosed, could be better described by an etiologic nomenclature.

The pathologic changes in skin and mucous membranes, however, are not the only symptoms of the disease. Besides the ulcerative eruptions on the extremities, the exudative lesions occur and recur around the eyes, nose, respiratory tract, rectum and the genitals. High body temperature (104° to 105°F.), erythema, macules, papules, vesicles, bullae, nodules and annular lesions are the most important symptoms.

Oral lesions are found chiefly on the lips, tongue and buccal mucosa. Gradually, these lesions ulcerate and a painful desquamation occurs. After rupture, the oral lesions are covered by a necrotic exudate or a pseudomembrane. Pain, sialorrhea and dysphagia follow with or

without lymphadenopathy. However, the oral lesions are less distinctive than those appearing on the skin, although the lips often swell and hemorrhage frequently. The oral manifestations of the disease are accompanied by halitosis and ptyalism. The patients suffer acutely and food intake is impaired. The macular and papular oral lesions show evidence of spongiosis, intracellular edema in the epithelial tissues, and inflammatory infiltration of the adjacent tissues. Some forms of erythema exudativum multiforme, especially its bullous type, are difficult to differentiate from herpes or pemphigus.

The disease is self-limiting but recurrences are common. An effective treatment has not been discovered, therefore, all therapeutic procedures can be symptomatic only. The use of antihistamines, massive doses of vitamin B complex and hydrocortisone are recommended. Antibiotic therapy may minimize secondary infections. The disease may be complicated by pneumonia, and when this complication occurs the outcome could be fatal.

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Diagnosis and treatment of functional disturbances of the masticatory system

A. Engelberger, K. H. Rateitschek and H. R. Mühlemann. *Schweiz.Mschr.Zahnhk.* 70:586-624 July 1960

Most of the functional disturbances occurring in the masticatory system are produced by the following factors: (1) abnormal muscular forces; (2) acquired or congenital disorders of the temporomandibular joint; (3) serious mental or physical stresses causing parafunction (bruxism or bruxomania); (4) extreme nervous tensions, and (5) occlusal disharmonies (such as interceptive centric contacts or cusp interferences during lateral movements).

In patients with periodontal disease, occlusal disharmonies often act as trigger zones for extreme spasms in the muscles of the masticatory system. In his diagnosis, the dentist should distinguish between parafunction (which can be determined easily), hypofunction, hyperfunction and dysfunction. All are contributing factors in the development of periodontal disease.

Hypofunctional and hyperfunctional zones can be distinguished clearly in the patients with periodontal disease who masticate unilaterally by habit. Dysfunctional stresses are often produced by an unequal distribution of the occlusal forces to the periodontal structures as in patients with abnormally positioned teeth or in those who show lack of proximal contact points. The same symptoms may occur after incorrectly performed selective grinding. However, in order to diagnose correctly any disharmony in the masticatory muscles or to detect the initial causes, it is necessary to make a detailed functional analysis of the entire masticatory system.

Treatment consists mainly in restoration of uninterrupted dental arches. Whenever raising of the bite is indicated, this should be carried out immediately with special care. Proper selective grinding will establish a favorable occlusion and re-establish a perfect articulation.

Treatment should be in three stages as follows: (1) removal of the most evident functional and physiognomic irregularities; (2) correction of interceptive contacts in centric occlusion, and (3) adjustment of the lateral and protrusive movements. However, the occlusal centric contacts established during the second treatment stage should under no circumstances be disturbed during the third stage.

To obtain a favorable centric occlusion, selective grinding should be carried out according to the method described by Jankelson, Hoffmann and Hendron (1953 and 1955). This method has proved especially successful in the treatment of patients with bruxism.

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Dental caries as a syndrome

Lucas I. Gonzalez. *Tribuna odont., Buenos Aires* 44:114-116 May-June 1960

Dental caries usually is regarded as a dental "disease." In medicine the term "disease" is sometimes replaced by the concept of "syndrome," because the diseases or the affections which once were thought to be isolated and independent have been shown to have a common pathogenic

mechanism that is neurohypophysoadrenal in nature. Thus gastric ulcer, acute disseminated lupus erythematosus, traumatic or surgical shock and the lipothymias, as well as certain forms of rheumatism and endocarditis and the granulomas (including those found periapically and in periodontal pockets) are no more than symptoms of Selye's general adaptation syndrome.

The tendency of the body is always to react in the same way, regardless of the noxa by which it is affected. So caries may have many different causes, but since the only reaction of which a tooth is capable is decay, these different causes always produce the same pathological process or mechanism. In this connection it must be remembered that investigators have found evidence to show that the processes of selective centrifugal and centripetal permeability of the enamel are metabolic in character. It is a mistake, however, to say that the metabolism of the enamel resembles that of bone. In reality, the enamel should be regarded as a covering tissue, which, like all such tissues, is capable of permitting an inward and outward movement of cells suspended in the liquid (or sebiparous substance, in the case of the skin) it secretes for its own protection. The enamel, like the epithelial coverings, depends for its vitality on the circulation of the underlying connective tissue (dental pulp) and, like them, it becomes ulcerated when that circulation is disturbed.

In the collagen diseases, which constitute one of the stages of the general adaptation syndrome as seen from the histopathological point of view, the fundamental phenomenon takes place in the heart of the connective tissue through the action of the enzymes. These may be either autogenous or exogenous. Hyaluronidase, for example, occurs in an inactive state in the normal connective tissue and is also a component of the covering of many pathogenic bacteria. Whatever their origin, the enzymes produce a depolymerization of the elements of the connective tissue and increase the permeability of the adjacent epithelium and the capillaries. This in turn leads to edema and the subsequent formation of the typical fibrinoid reticulum of the collagen diseases. Virtually the same mechanism is found in "chelation." The enzymes, or other agents, separate the glucoproteins of the enamel from the apatite, and this separation, which originates in the buccal medium, according to the chelation theory, also takes place when the process begins in the pulp itself.

These considerations form the basis of investigations now being made into (1) the influence of psychic factors on dental caries in human subjects and (2) the existence of a reflex mechanism in the pathogenesis of caries in rats of susceptible strains.

Acevedo 1973, Buenos Aires, Argentina

Dental calculus in the germ-free rat

R. J. Fitzgerald and E. G. McDaniel.
Arch.Oral Biol. 2:239-240 Aug. 1960

Postmortem examinations of the jaws of germ-free rats reveal the presence of an adherent pellicle on the maxillary first molars in most of the animals. The deposits were confined mainly on the mesial surface of the maxillary first molar, but occasionally could be found on the buccal surface of the second cusp of this tooth in addition. In size and texture, the pellicles resembled those seen in non-germ-free rats maintained on cariogenic diets. Roentgen-ray diffraction studies of the brittle pellicular material resulted in patterns coinciding with those of apatite.

Periodic bacteriologic checks on the food and excreta of the animals revealed no viable microorganisms. Gram-stained smears of decalcified deposits confirmed the absence of microorganisms.

Thus, it seems apparent that dental calculus deposition can occur in the germ-free rat in the absence of a microbial flora. This observation does not rule out microbial participation in dental calculus formation in conventional animals.

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Bone tumors: cancer diagnosis for the general practitioner

L. Eckmann. *CIBA Symp.* 8:80-83 June 1960

In the diagnosis of bone tumors of the maxillofacial region, it is important to realize that these tumors can derive from cancellous, myeloid or reticuloendothelial tissue as well as from osseous tissue.

Of the osteogenic tumors, chondroma and giant cell tumor usually are benign. Malignant changes occur in less than 20 per cent. However, the dental and medical practitioner should regard these tumors as dangerous even if the histologic findings had been negative in regard to malignancy.

Malignant bone tumors include osteogenic sarcoma, chondrosarcoma, myxochondrosarcoma and osteoplastic or osteolytic sarcoma. The prognosis generally will be unfavorable. Pain may occur at an early stage but the malignant degeneration of the adjacent soft tissue will not become apparent before a later stage.

Suspicion of the presence of a malignant bone tumor may arise from observing a dental roentgenogram. Confirmation may be based on histologic findings. Biopsy examination, however, may lead to inaccurate differential diagnosis, especially if the tissue had been removed from the edge and not from the center of the tumor. Frequently, a malignant tumor is diagnostically confused with giant cell tumor, osteomyelitis, inflammation of bone tissue caused by a pyogenic microorganism, osteoporosis, ostitis fibrosa cystica or generalized fibrosa osteodystrophia (both are forms of Recklinghausen's disease).

The pessimistic prognosis should never be allowed to interfere with efforts to establish a definite diagnosis. Although the prognosis in instances of primary osteogenic sarcoma is unfavorable, patients with secondary sarcoma (reticular and sclerotic forms) have a good chance of recovery. Most dangerous of all malignant tumors are not the osteogenic neoplasms but those which involve the bone marrow.

Involvement of the bone marrow occurs in undifferentiated round cell sarcoma (medullary cancer or Ewing's sarcoma). This disease attacks mainly children and young persons. It is important to recognize that the roentgenograms may greatly resemble those of osteomyelitis, and that the prolonged attacks of fever associated with Ewing's sarcoma may cause confusion with certain inflammatory diseases of bone.

In establishing the diagnosis, the most important points to observe are as follows: (1) blood count; (2) presence or absence of dental foci of infection, and (3) histopathologic findings after examination of biopsy specimens.

In adults, particularly patients over 40 years old, neoplastic growth in the bones usually is metastatic in character. Because the primary tumor may not yet have been detected, the metastases seldom are recognized as such.

Diagnosis is simplified if the metastases occur at sites atypical for a primary tumor or where rapid degeneration occurs, or when body section roentgenography (tomography) reveals the absence of sequelae, or when routine roentgenographic examinations show definite osteoplastic or osteolytic changes. Malignant bone tumors lead frequently to the formation of secondary tumors in distant regions.

Histologic examination of biopsy species obtained from bone will not always provide information regarding the primary tumor. In the presence of multiple bone metastases, even if the primary tumor is detected at an early stage, any form of treatment will seldom succeed in arresting the unfavorable course of the disease.

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Pathologic effects of smoking on the larynx and oral cavity

Kenneth D. Devine. *Proc.Mayo Clin.* 35:449-352 June 22, 1960

No researcher has produced cancer of the oral or laryngeal mucous membrane in animals by blowing smoke on the mucous membrane. The oral

mucous membrane is resistant to the topical application of tobacco carcinogens. It is asserted that since there are no sebaceous glands or hair follicles in the oral mucosa, there is no portal of entry for the dissolved carcinogens.

In 1954 there were 4,210 men and 1,172 women in the United States who died from cancer of the oral cavity. The incidence per 100,000 population is estimated to be 19.5 for men and 5.2 for women. In 1950 there were 1,661 men and 192 women who died of cancer of the larynx. The incidence of laryngeal cancer in the United States is estimated to be between 3 and 4 per 100,000 population. Smoking is an important factor in the development of cancer of the oral cavity. Of 659 patients with oral cancer, only 3 per cent of 543 men never smoked, in contrast to 10 per cent of the controls, whereas 29 per cent smoked excessively as compared with 17 per cent of the controls. Cigar and pipe smoking increase the risk of cancer of the oral cavity more than cigarette smoking; 34 per cent of the patients with oral cancer smoked cigars, pipes, or both, in contrast to 21 per cent of the controls.

In women there were twice as many nonsmokers among the controls as among the patients with oral cancer, whereas there were three times as many chain smokers among women with oral cancer as there were among the controls. It has been estimated that four of every five instances of cancer of the oral cavity in American men are preventable.

Numerous clinicians have asserted that tobacco is the chief irritant that causes leukoplakia of the mouth. Leukoplakia and polypoid degeneration of the vocal cords often are associated with excessive smoking; often this leukoplakia disappears after the cessation of smoking.

Comparison of microscopic sections from the larynx of nonsmokers with sections from the larynx of subjects known to smoke to excess reveals a thicker surface epithelium in smokers than in nonsmokers, owing in part to excessive keratinization of the true cord but mostly to epithelial hyperplasia of the false and true cord and the subglottic region, and to a greater degree of round cell infiltration, edema and squamous metaplasia in the smokers.

The physician must now accept the responsibility of informing himself of the facts regarding the effect of smoking on health. The overwhelming mass of substantiated facts no longer permits him to be jocular about or remain aloof from this problem.

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Cancer of the tongue: review of 137 case reports

A. Voutilainen and P. Tuovinen
Ann.chir.gyn.fenn. 48:332-339 May 1960

Malignant tumors of the tongue now represent from 2 to 3 per cent of all cancers, and are responsible for from 1 to 2 per cent of all deaths from cancer.

Malignant tumors in the anterior part of the tongue were much more amenable to treatment than those in the base of the tongue. In instances in which the size of the tumor was less than 3 cm. in diameter, the five year cure rate was 65 per cent; but the five year survival rate dropped to 15 per cent in instances of more extensive tumors which included those with metastatic involvement.

One hundred and thirty-seven patients with cancer of the tongue were treated at the Oral Surgical Clinic of the University of Helsinki, Finland, between 1949 and 1953. Diagnostically, the tumors were classified Grade I, II and III, according to the degree of malignant growth and the presence or absence of metastases. Grade I included all tumors of the tongue without evidence of metastasis. Grade II included tumors with metastatic involvement beneath the skin or in the neck. Grade III included tumors which had invaded the base of the tongue with evidence of metastases in distant sites.

Treatment consisted of radical surgery usually by electrocoagulation, surgical enucleation combined with irradiation or irradiation alone. The methods of irradiation used were teleroentgenotherapy, roentgenotherapy and radium therapy.

When all treatment forms were considered, review of these 137 case reports revealed that the five year survival rate was 41 per cent for the 130 histologically verified instances.

Patients with Grade I tumors usually had been treated by electrocoagulation; the five year sur-

vival rate was 69 per cent. In the group with Grade I tumors treated with surgical enucleation combined with irradiation, the rate was 63 per cent. In the group with Grade II tumors, treated with surgery combined with irradiation, the rate was 36 per cent, whereas in the group with Grade III tumors, the rate was 17 per cent.

Of the patients treated with irradiation alone, 17 per cent were alive five years or longer after treatment. The series included only nine patients with malignant tumors of the tongue with distant metastases. Those patients whose condition permitted it were given external roentgenotherapy as palliation. None improved significantly.

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Potential effects of neomycin on tumor growth

S. Renaud. *Arzneimitt.Forsch.* 10:366-368 Aug. 1960

The toxicity, and particularly the nephrotoxicity, of the various antibiotic agents is well-known. Neomycin is one of the most toxic antibiotics, partly because of its specific properties and partly because of frequent impurities caused by faulty production.

Neuromuscular blockade often occurs after interperitoneal injection of neomycin. Myocardial lesions occurring after neomycin administration, however, have not been reported.

Certain antibiotic agents have some inhibiting effects on the growth of transplanted tumors, but it appears that all the reports on the antitumoral action of neomycin have been negative.

Ninety female Sprague-Dawley rats, with an average body weight of 200 Gm., were divided into nine equal groups, and lymphosarcoma (1 Gm. of tumor tissue in 5 ml. of a physiologic saline solution) was implanted on the first experimental day by intramuscular injection.

Neomycin sulfate was administered subcutaneously (8 mg. in 0.2 ml. water) twice daily throughout the first experiment, and during the last five days of the second experiment. During the first five days of the second experiment, the drug was administered once daily.

The duration of the experiments was seven days for the first investigation, and ten days for the second.

At the end of these periods, all surviving rats were sacrificed. After macroscopic examination, the tumor, heart and kidneys of all animals were fixed in an alcohol-formaldehyde solution, embedded in paraffin, and stained with hematoxylin-phloxin (von Kossa method).

Under the conditions of the first experiment, repeated several times, the most striking result was the complete absence of tumor growth in the group treated with neomycin, although from the fifth experimental day a significant increase in the mortality rate was observed.

In the control groups, the tumor growth was evident after the fourth day, and at the end of the experiment, the tumor had increased in size (from two to three times) and the transplanted tumor cells had invaded the muscular fibers.

In the groups treated with neomycin, autopsy revealed the absence of tumor growth. Microscopically, the tumor transplant did not invade normal cells. This tumor inhibition was always accompanied by nephrocalcinosis.

The second experiment in which increased doses of neomycin were used was devised to determine whether it was possible to diminish the toxic effects without decreasing the tumor-inhibiting property of neomycin. Bacteriostatic, toxic and antitumoral effects of the drug were observed in the series in which high dosages were used from the beginning of the experiment.

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Oral surgery

The value of glossopexy in Pierre-Robin syndrome

Chris T. Oeconomopoulos. *New England J.Med.* 262:1267-1268 June 23, 1960

The Pierre-Robin syndrome is a congenital anomaly manifested by glossoptosis, hypoplasia of the mandible, cleft palate, inspiratory retractions of the sternum, cyanosis and malnutrition.

The indications for surgical intervention are twofold: (1) displacement of the mandible behind the maxilla by more than 1 cm., and (2) the presence of pronounced feeding and respiratory problems. In some instances an emergency tracheostomy in a deeply cyanotic infant near death is necessary.

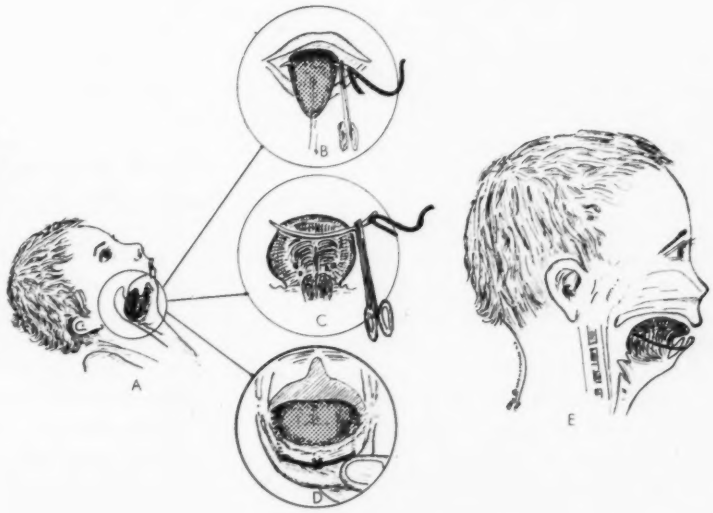
A modification of the Duhamel procedure (1953) for glossopexy provides a simple, valuable method for the treatment of glossoptosis in the patient with Pierre-Robin syndrome.

The purpose of the operation is to correct the ptosis of the tongue. This surgical procedure is indicated in all moderate and severe instances of glossoptosis to resolve respiratory and feeding problems, prevent atelectasis and permit nutrition and growth.

The mouth is prepared with aqueous benzalkonium chloride, 1:1,000 solution. The tongue is held forward by a single silk traction suture placed through the tip (see illustration). A no. 5 silk suture on a curved Mayo-type round, heavy needle is placed through the base of the tongue at a depth of 4 to 6 mm. The heavy needle is removed. A small Ferguson-type needle is placed on each end of the suture. The needles are passed through the cartilaginous portion of the mandible 1 cm. lateral to the mid-line and tied. This causes no bleeding and only transient discomfort.

The release of the respiratory obstruction is dramatic and can be easily maintained. The suture is left in for six weeks and if properly placed does not cut through. During this time the patient's state of nutrition is improved, resulting in increased strength in the floor of the mouth.

The suture can be left in place longer if necessary, but this may interfere with the eruption of the teeth. If any dental problems arise during the eruption of the permanent teeth, such problems may be corrected by the orthodontist. This method of glossopexy is presented only as a sim-



Schematic drawing of the modified Huhamel method of glossopexy. The ptosis of the tongue (A) obstructs the air passage. A no. 5 silk suture is placed through the base of the tongue (B). The vessels and nerves of the tongue are avoided (C). The tongue is held forward with the suture relieving obstruction (D and E)

ple, life-saving procedure when severe respiratory complications are produced by glossoptosis. The operation can be performed on the treatment-room table, even by the inexperienced assistant resident or intern, within five minutes. No anesthesia is necessary.

Four case reports illustrate the relief obtained by glossopexy.

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Surgical repair of the facial nerve in the parotid and masseteric regions

Adolf Miehlke. *German M.Monthly* 5:223-224 July 1960 and *Deut.med.Wschr.* 85:506-510 March 25, 1960

The surgical approach to extratemporal lesions of the facial nerve is influenced by two factors: (1) the comparatively high incidence of facial nerve lacerations in facial injuries resulting from traffic and industrial accidents, and (2) the realization that successful radical excision of malignant tumors of the parotid glands often requires the sacrifice of the facial nerve.

The surgical treatment of tumors of the parotid gland has been greatly modified since the recognition that the parotid gland has two lobes and since Hamilton Bailey (1947) advocated preservation of the facial nerve during parotidectomy. However, if malignant tumors of the parotid gland are to be excised successfully, preservation of the facial nerve must be relegated to a secondary aim. Sometimes, various branches of the nerve or even the entire nerve may have to be sacrificed.

Even during removal of benign parotid tumors it is often necessary to section some of the small branches. In instances of malignant growths (especially cylindroma), preservation of even a portion of the facial nerve is indicated only in instances in which the malignant growth appears to be confined to the external lobe of the parotid gland, and in instances in which the prognosis based on histologic examination is relatively favorable. When such a calculated risk is incurred, postoperative roentgenotherapy, employing doses between 3,000 and 4,500 r, is essential.

The American surgeons, F. D. Lathrop (1949), J. H. Maxwell (1954) and J. J. Conley (1959) have described surgical methods to obtain repair of the facial nerve on its extratemporal course, utilizing principles derived from experience gained in peripheral nerve surgery. However, when one of the main branches of the facial nerve has been sectioned proximal to the parotid isthmus, permanent damage to the function of the nerve results. Restitution may be achieved by suture of the nerve stumps, utilizing the "end-to-end" technic. The suture is passed through the epineurium of each stump under the operating microscope. A polythene (cylindric) tube, approximately three times the diameter of the nerve, is passed over the distal stump. The tube provides a track for the anastomosis and prevents excessive scar formation around the suture. Through the window of the tube a revision of the anastomosis and suture can be performed. About six months are required before the results of the indirect anastomosis become apparent, and even then, the patient should be advised to practice the facial muscular movements before a mirror to prevent the formation of disturbing associated movements.

During total parotidectomy with radical neck dissection, both the main trunk and the peripheral branches of the facial nerve often must be sacrificed. Reconstruction by using nerve autotransplants is indicated. New fibers will grow through the transplant almost as rapidly as through the peripheral segment of the transected nerve.

With the increase in industrial and traffic accidents, injuries to the face have increased alarmingly during recent years. The best approach to evulsion of the facial nerve consists in immediate anastomosis by direct suture or by plastic repair at the time of the primary surgical intervention.

Anastomosis of the stumps of the facial nerve by using the hypoglossal or the accessory nerves is not a satisfactory procedure. Because of the loss in function caused by severing these nerves as well as because of the development of undesirable associated movements, this surgical procedure should be reserved only for instances in which the proximal facial stump cannot be mobilized.

Electromyography may serve in deciding whether facial nerve function is likely to return. If there is no favorable prognosis, the facial nerve must be exposed and an "end-to-end" or an indirect anastomosis has to be carried out. If the nerve had been severed at the stylomastoid foramen, mastoidectomy must be performed, and the prox-

imal nerve stump located in the fallopian canal. In such instances, the use of a long autograft is of course required.

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Oral surgical interventions and postoperative management in patients with advanced tuberculosis

Th. Sacher. *J.dent.Belge* 51:243-254 March-April 1960

Since the introduction of tuberculostatic agents inhibiting the growth of *Mycobacterium tuberculosis,* oral surgical interventions and postoperative care in patients with advanced tuberculosis have been considerably facilitated.

However, the administration of certain tuberculostatic drugs may lead to opposite results, either an immediate postoperative hemorrhage or excessive blood clot formation.

The use of paraaminosalicylic acid (PAS) or its derivatives and of isonicotinic hydrazine (INH) or its derivatives for the treatment of tuberculosis prior to dental or oral surgical procedures predisposes to hemorrhage in the oral cavity. Isonicotinic hydrazine combined with other tuberculostatic agents (besides paraaminosalicylic acid) contributes to the formation of the so-called "dry sockets." In dental patients receiving these drugs either combined or singly, slow and persistent gingival hemorrhages may occur even several days after dental or oral surgical interventions. However, these hemorrhages usually are controllable by administration of hemostatics applied locally. The relief of pain arising from postextraction alveolitis is necessary.

Patients with advanced tuberculosis who develop alveolitis after dental procedures and show insufficient regeneration and granulation are difficult to treat at the dental office. At the time of the operation the necessary precautions must be taken to avoid inflammation of the involved nerves, particularly because the resistance of these patients is greatly reduced. It is possible that the physician concerned with the treatment of tuberculosis already had initiated antibiotic therapy and, therefore, the use of the same antibiotics at the dental office is contraindicated because of the acquired resistance to these agents. With patients under medical care, the cooperation and advice of the physician should be sought before penicillin or sulfonamides are applied.

In patients with tuberculosis, cauterizing postoperative medication frequently results in effects which are the opposite of those anticipated.

Occasionally, the dentist will be forced to prescribe derivatives of morphine to prevent the occurrence of violent spasms induced by extreme pain in the region of the jaws that radiates to the neck. The liability of addiction from all morphine compounds, however, is serious. No strong analgesic or narcotic agent should be administered at the dental office if the use of a less harmful analgesic would suffice.

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Facial injuries and tracheotomy

J.A.M.A. 173:743 June 11, 1960

Q.—Would you outline the indications for tracheotomy in accident victims who are in coma or who have had moderately severe or severe injury around the lower jaw and upper neck?

A.—Tracheotomy should not be performed routinely for all patients who have moderate to severe injuries around the lower jaw and upper neck, because it is not always necessary. There is some inherent danger in tracheotomy, and it is too serious a procedure to be performed unless needed. Some of the indications for tracheotomy include: (1) facial and jaw injuries which preclude good oral hygiene and tracheal toilet, (2) airway obstruction when a satisfactory exchange cannot be maintained, (3) jaw and neck injury in most patients in whom a coma has lasted more than 24 hours, and (4) crushing injuries of the chest in patients who required treatment with pressure-respiratory apparatus.

Tracheotomy should be performed when administration of an anesthetic is required in patients with the afore-mentioned injuries and an anesthesiologist competent to use intratracheal tubes is not available.

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Roentgenology

Simple recording of immediate radiobiologic effects

H. B. Lamberts. *M.Mundi* 6:44-47
April-Aug. 1960

In many countries the increased use of nuclear energy has stimulated research on the biologic effects of ionizing radiation. One of the most important results of radiobiologic research appears to be the possibility of limiting the effects of radiation on living persons by administering certain chemical compounds.

Chemical protection against ionizing radiation was studied in the physiologic department of the University of Groningen, The Netherlands. The study was guided by the following principles:

1. In suitable biologic objects an attempt was made to find a sensitive radiobiologic reaction which could be measured and recorded during or immediately after irradiation even if only moderate doses (as in dental roentgenography) had been used.

2. In living persons such a sensitive radiobiologic reaction cannot be found in the cytoplasma because a natural protection exists against radicals arising during biologic mutual reduction and oxidation (redox) processes.

3. In living persons this natural protection renders the radicals (caused by radiolysis) innocuous.

These radiosensitive reactions, therefore, are to be searched for either in cell nuclei or outside the cells where no (or little) redox processes occur. Extracellular processes are more easily accessible for experimental examination.

Demonstrable radiosensitive reactions can be detected best in macromolecular systems. Any change in a specific atom influences the entire molecule.

The radiation reactions can be demonstrated by chemicophysical methods which indicate accurately the degree of cross-linking and depolymerization.

Synovia, obtained from the joint cavities of freshly slaughtered cattle, was used for the viscometric examination without chemical processing.

The mucopolysaccharides which are responsible for about 80 per cent of the viscosity of the synovia, consist of 70 per cent hyaluronic acid and 30 per cent protein. The total quantity of hyaluronate in synovia, however, is about 0.05 per cent.

The immediate effect of irradiation on the viscosity of synovia was measured with an Ostwald outlet viscosimeter and recorded with an Epprecht structure viscosimeter.

An appreciable drop in viscosity was observed during and immediately after irradiation with moderated doses of roentgen rays (taking diagnostic dental roentgenograms). This drop in viscosity is the result of a diminution of the relevant macromolecules; therefore, of the depolymerization process. After radiation with moderate doses, a further drop in viscosity was obtained, demonstrated by the use of hyaluronidase. Probably the enzymatic and radioactive depolymerization processes have different working mechanisms. In contrast to other radiobiologic effects, it was observed that high oxygen tension in persons to be examined roentgenographically causes aggravation of radiation damages. Hypoxia and anoxia, however, produce protective effects.

A solution of 0.9 per cent sodium chloride and 1.0 per cent cystamine was injected in human subjects who had been exposed to high radiation doses. This chemical substance renders a certain degree of protective action against biologic damage caused by radiation.

A solution of 0.9 per cent sodium chloride not containing cystamine was injected in the same subjects with another syringe. The difference in pressure decrease occurring after irradiation was distinct in spite of the fact that the radiation dose at the protected site was ten times greater than that at the unprotected site.

The study had been specially directed toward obtaining natural protective substances which probably are present in the cytoplasma.

A comparison of the results obtained with human subjects with the results of animal experi-

ments to demonstrate clearly the influence of these chemical substances on the survival rate in irradiated test animals is indispensable for further research.

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A simple device for rapid copying of roentgenograms

William C. Owsley, Jr. *Texas J.Med.* 56:676-677 Aug. 1960

Those wishing small roentgenographic prints to file with patient records, or lantern slides for use in lectures and conferences, will find useful a simple device for copying roentgenograms. The method produces paper prints in about two minutes. Finished 3¼ by 4 inch lantern slides can be produced in about ten minutes. The device is designed to be operated by office personnel or technicians with no previous training in photography.

A Polaroid no. 208 Copymaker is modified by replacing its plywood base with a homemade glass-topped box that contains a circular fluorescent tube. This provides a source of transmitted light in addition to the reflected light sources supplied with the Copymaker.

The light box is made of ¾ inch plywood with outside dimensions of 7 by 21 by 22 inches. The glass portion of the top measures 14 by 17 inches. The Copymaker is attached to the box with two screws, and the fluorescent tube is wired into the Copymaker base through a toggle switch. A drawer in the back of the box provides storage space for extra film.

Any of several available models of the Polaroid Land camera is satisfactory. When attached to the arm of the device, the camera is centered automatically to the glass portion of the light box top. The Copymaker incorporates an exposure and development timer, the necessary supplementary lenses and filter, plastic focusing screen, exposure charts, masking device, a copyboard to show the areas copied at various camera settings, and operating instructions. (The device also can be used to make prints or slides of drawings, photographs and small specimens.)

Use of a horizontal light box obviates the need for clips to hold the roentgenogram during exposure.

For copying a document by reflected light, the instructions supplied with the unit are followed. The copyboard is laid on top of the light box to determine centering and area of coverage. For copying a roentgenogram, the same procedure is followed except that the copyboard is replaced by a piece of clear film marked with various sizes of rectangles. Exact placement of the copyboard or clear film is assured by guide lines at the edges of the glass top. The roentgenogram to be reproduced is moved beneath the clear film until the desired area to be reproduced is included within one of the marked rectangles. The rectangle selected determines camera height and focus, this information being read from a small card fastened to the base of the Copymaker. The clear film then is lifted off the light box, exposure made, and the copy developed and coated. Exposure time is six seconds for roentgenograms of normal density. Development time remains constant at one minute. For paper prints, PolaPan 200 film, type 42, is used. Cost of prints is about 25 cents each. Slides with mounts cost about 95 cents each.

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Therapeutics

Anaphylactic reaction to aqueous chymotrypsin injection

Kenneth D. Rose. *J.A.M.A.* 173:796-797 June 18, 1960

A 19 year old varsity football player was admitted to the University Health Center after an acute facial injury. A diagnosis of multiple fractures of the right maxilla was made. Because of intense edema, ecchymosis and antrum hemorrhage which precluded immediate reduction of the fractures, he was treated with ice packs and the deep intramuscular injection of 1 cc. (5,000 units) of aqueous chymotrypsin every 12 hours. Prior to injection, an intradermal skin test was done, with a negative result. Ancillary treatment in the form of oxytetracycline with glucosamine, meperidine hydrochloride, and an acetylsalicylic acid, acetophenitidin, and caffeine (Empirin) compound with codeine was given.

By the third day, the edema and ecchymosis had subsided sufficiently to allow reduction of the fractures. The patient continued to receive treatment with aqueous chymotrypsin, 1 cc. daily. On the eighth day, having received his tenth injection, he complained of itching and inflammation about the injection site. When he was examined on the next morning, nothing was seen. The eleventh and last injection was given at 10 A.M. Symptoms of uneasiness began almost at once, and by 10:10 A.M. the patient was pulseless.

He was first seen at 10:15 A.M. and was in profound shock and cyanotic, complaining of dyspnea and with an urgency to void but an inability to do so. Complaints of precordial pain were prominent. One cubic centimeter of epinephrine in oil had been administered and oxygen was being given by face mask at 7 L. per minute. One hundred milligrams of hydrocortisone sodium succinate was given intravenously immediately. The apical beat was between 120 and 140 per minute, peripheral pulses were unobtainable, and blood pressure readings were zero. In five minutes the picture had worsened, dyspnea becoming more apparent with the appearance of phlegm in his throat. His lungs sounded clear, but 2 cc. of caffeine sodium benzoate was administered hypodermically. Carpopedal spasm was apparent and the oxygen mask was removed; from then on, oxygen was administered by suspension of the mask over his face.

By 10:40 A.M. his breathing was easier, blood pressure was up, but no peripheral pulse was palpable. A second 100 mg. of hydrocortisone sodium succinate was given intravenously. His color gradually returned to normal and by 12 noon his blood pressure was 110/80 mm. Hg., pulse rate 86 per minute and respirations 18 per minute. His chest pain and urinary urgency were gone. Oral corticosteroid treatment was instituted. At 4:30 P.M. the patient stated, "I feel the best I have felt since I came back from surgery." He attended classes the next day and has been completely well since. The oral corticosteroid therapy was continued for six days in decreasing doses.

Serious anaphylactic shock had resulted from intramuscular injections of aqueous chymotrypsin, sensitivity having been built up over eight days.

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Experimental use of proteolytic enzymes in the treatment of oral and associated lesions

Stanton J. Oliver. *Oral Surg.,Oral Med. & Oral Path.* 13:641-647 June 1960

The presence of necrotic tissue and its products constitutes a threat to contiguous normal viable tissue, and the body should be aided in the rapid removal of these dead elements. Trypsin, a proteolytic enzyme derived from the pancreatic secretion of mammals, is being used successfully in many fields of dentistry and medicine for the selective physiologic debridement of necrotic tissue.

In vitro, trypsin digests fibrin and clotted blood quickly and quantitatively. When applied in vivo to a purulent and necrotic lesion, trypsin rapidly

lyses the fibrinous strands and coagulum on the surface of the lesion. This lysis occurs in a matter of minutes; trypsin digests the slimy, viscid coating of desoxyribose nucleoprotein of the purulent exudate and then attacks any dead tissues in the lesion. There is an outpouring of serum, which floats off the digested debris. The exudate becomes thin and serous. Bacteria rapidly decrease in number and finally may disappear. As treatment is continued and the exudate decreases or ceases, a clean, granulating pink surface appears.

Trypsin is available commercially in capsules containing 250 mg. of powder. Several rules should be observed to obtain maximum results.

Proteolytic activity is optimal between pH 6.8 and 7.5, the maximal activity being at pH 7.1. Therefore, when trypsin is used in cavities it should be employed in a solution of Sorensen's phosphate buffer. Prior to the use of trypsin on a surface lesion, the pH of the surface should be tested with Nitrazine paper. If the surface is extremely alkaline or too acid, trypsin should be used in a buffered solution. It is best applied as a wet dressing. When a surface lesion is found to be within the optimal pH range, powdered trypsin may be applied directly to the area.

Any temperature below normal body temperature rapidly inactivates trypsin. Therefore, external heat should be used whenever surface dressings are applied.

At room temperature a solution of trypsin loses 75 per cent of its enzymatic activity after three hours. Therefore, the solution should be prepared just prior to the time of use, and, for continuous activity, dressings must be changed every three hours.

When trypsin is employed in a body cavity, a histaminelike reaction may take place within the first few treatments, because of continuous absorption. This reaction may be prevented by prior administration of 25 to 50 mg. of diphenhydramine hydrochloride intravenously, or it may be eliminated by the oral administration of 50 mg. of diphenhydramine hydrochloride at three-hour intervals. The only side reactions noted with the use of trypsin in body cavities are a mild elevation of temperature and an increased pulse rate. When trypsin is used on the surface, the reactions encountered are a mild burning or stinging sensation. If necessary, the activity of trypsin may be stopped immediately by flushing the area with a sodium bicarbonate solution.

Trypsin may be used to advantage in the treatment of lesions of the mouth and associated structures. Specific indications for topical application include such conditions as ulceromembranous stomatitis, ulcerative and desquamative stomatitis, necrotic gingivitis, dry sockets, necrotic wound sites, surgical sloughs, fistulas, and any stomatitides arising from blood dyscrasias.

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Comparison of post-operative pain and stiffness after the use of suxamethonium and suxethonium compounds

G. D. Parbrook and G. F. M. Pierce.
Brit.M.J. No. 5198:579-580 Aug. 20, 1960

Muscular pain and stiffness after the use of short-acting relaxants of the depolarizing variety is a major problem after dental inpatient anesthesia. A clinical trial was carried out on 100 inpatients to compare the incidence of muscular pain and stiffness after the use of succinylcholine chloride (suxamethonium) and suxethonium compounds. The operative procedures consisted of routine oral surgery and plastic operations about the mouth.

Anesthesia was induced by the intravenous injection of thiopental sodium, and was maintained by means of nitrous oxide, oxygen and halothane. The two relaxants chosen for comparison were suxethonium bromide in a dose of 180 mg. and succinylcholine chloride in a dose of 50 mg.

In the 50 patients receiving suxethonium bromide, severe stiffness or pain was noted in 13 and mild stiffness in 25. In the 50 patients receiving succinylcholine, severe stiffness or pain was noted in 13 and mild stiffness in 20. Thus, no significant difference existed in the incidence of pain and stiffness with the two compounds.

The character of the stiffness was not influenced by the relaxant used. The distribution was as follows: neck, 59 per cent; abdomen, 33 per cent; chest, 31 per cent; back, 10 per cent; and shoulders, 9 per cent. The onset normally was 12 to 24 hours after the operation.

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Newer concepts of pain control in dental practice

Leonard M. Monheim. *J.Tennessee D.A.* 40:169-175 July 1960

Prior to the 1930's, pain control in dental practice was a neglected field, with even local anesthetics being used primarily for exodontia or related surgery. The discomfort of cavity preparation was looked on as a necessary evil.

In the middle 1930's, the use of local anesthetics for cavity preparation began to receive acceptance by the dental profession. Patients readily accepted this relief and were grateful for it. Before many years had passed, patients were not only expecting relief from discomfort but were demanding it. With this demand, the use of local anesthesia was tremendously increased, and the standards of dental practice were raised. However, this was only a superficial approach to the problem of pain control in dental practice, as local anesthesia afforded a measure of comfort only during the dental procedure. A new concept of pain control was required, which emphasized that pain control should not be confined to the dental office, but that the anxiety, apprehension and any pain during the preoperative period and the discomforts experienced postoperatively should receive consideration.

To allay preoperative fear and apprehension, the best results usually are obtained with hypnotics—those drugs which depress the central nervous system at a cortical level. To obtain the hypnotic effect, the barbiturates are the most widely used, and their dosages should be calculated for the individual patient.

The preanesthetic evaluation is an important part of over-all treatment planning, and no patient should be subjected to a local anesthetic and subsequent treatment without the benefits of this important step.

Based on the preanesthetic evaluation, the anesthetic solution should be chosen to fit the needs of the patient, rather than attempting to make the patient fit the only anesthetic which the dentist may have available. The anesthetic agent should be chosen to fit the patient's time requirements. For example, a long-acting anesthetic should not be chosen when the procedure will be of comparatively short duration. Also, the patient's sensitivities and previous reactions should be considered.

The addition of vasconstrictors to the anesthetic solution both increases the duration of the anesthetic and reduces toxicity by retarding absorption of the solution into the systemic circulation.

The use of a local anesthetic solution should be considered a two-step procedure, the insertion of the needle and the deposition of the solution. For deep injections, the needle should be of 25 or 23 gauge, as to use anything smaller makes the use of the aspiration technic difficult.

No patient should be permitted to leave the office after dental treatment without some preparation for any discomfort which might be experienced during the postoperative period. Such discomfort is best alleviated by either analgesics or narcotics. Analgesics alleviate pain by interfering with pain perception at a subcortical level; narcotics interfere with both pain perception and pain reaction. Analgesics can be prescribed safely for patients going about their daily duties. Patients for whom a narcotic agent has been prescribed should not be allowed to go about their daily duties. The cortical depression may interfere with normal judgment.

The most common analgesics are either salicylates or para-aminophenols. These are weak drugs and therefore suitable only to control mild pains. Recently, two new drugs—ethoheptazine citrate with acetylsalicylic acid (Zactirin), and dextro propoxyphene hydrochloride (Darvon)—have been introduced. These drugs are referred to as non-narcotic, nonbarbiturate analgesics. They are more potent than the salicylates or the para-aminophenols but less potent than the narcotics.

The narcotics, which raise the pain threshold to a greater degree than any other drug, are indicated for patients expected to experience moderately severe pain. The narcotics are habit-forming and should not be used when a non-narcotic analgesic drug would be capable of alleviating the discomfort. Codeine alone, or with acetylsalicylic acid, acetophenetidin, caffeine or other drugs, may be used for the control of the vast majority of dental pains.

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Dentistry around the world

Native dentists in Laos

R. Pechard. *Inform.dent.,Paris* 42:982-984 July 28, 1960

When an itinerant native dentist announces he is visiting one of the communities of the mountainous region of Laos, he is assured that many residents of that area will attend his demonstration. Although the dentitions of the population of Laos are almost free from carious lesions, esthetic principles require the insertion of shining metal crowns. European and American dentists, serving within a religious mission, usually refuse to perform such a service and, therefore, the itinerant native dentists treat more patients than the white dentists.

The traveling dentist carries his instruments (hammers and simple pliers) and preformed copper crowns in his chest. After his arrival in a native village, he occupies a platform in the market place. He does not possess a dental chair; the natives are satisfied to use a large rock or tree stump. Tooth extractions are seldom required, because occasional toothache is treated by medicine men. According to a myth believed by all tribes of Laos, toothache is caused by a curse of vengeance inflicted upon the sufferer by a personal enemy. To expel the evil demon, the medicine man charges a higher fee than is charged by the native or even the white dentist for dental treatment (a buffalo compared with two and four chickens respectively).

If the medicine man's exorcistical magic rites are unsuccessful, the patient waits patiently for the next visit of the itinerant native dentist. Then the tooth will be extracted, naturally without use of analgesic or anesthetic agents.

After a long palaver to establish the fee, which has to be paid before any dental procedure is initiated, the native dentist starts his main activity, that is the insertion of metal crowns. With his dirty fingers he selects the type of preformed crown which he feels most suitable, and drives the crown with a few blows of the hammer over the tooth surface. If the crown does not fit properly and spaces are present between tooth and crown, a little bit of cement is used. If the inserted crown disturbs the occlusion, a few hammer blows are sufficient to drive the crown into position with no regard for the injury being done to the gingival tissue. Resulting pain is of minor importance; dentist and patient are satisfied to demonstrate the shining new copper crowns.

After having treated in this manner an average of 100 patients a day, the native dentist leaves the village in a great hurry. Complications arising from this unique crown insertion usually force the patients to consult the white dentist at the mission. Even if this dentist has not been trained at a dental school, he usually is able to perform the most important dental procedures satisfactorily, because he has attended dental courses which are given together with his theological training.

Boîte Postale 247, Vientiane, Laos, Southeast Asia

School dental health service and pedodontics in Bulgaria

Gisela Schützmannsky. *Deut.Stomat.* 10:548-553 July 1960

In the "People's Republic" of Bulgaria with a population of about 7,500,000, there are 200 dentists who specialize in pedodontics or school dental service, under the supervision of the federal public health department of the Ministry of Welfare. However, these dental specialists reside and practice mainly in the larger cities, rarely in the rural districts. Sofia, the nation's capital, employs 80 school dentists. One school dentist, therefore, has to examine and treat about 3,000 school children attending three or four public schools.

Most Bulgarian public schools have school dental clinics; the larger schools have separate orthodontic and pedodontic clinics. In these clinics, 16,800 school children were examined and treated in 1959. More than 6,000 additional

children were referred to the clinics of dental colleges for oral surgical treatment.

School dentists and pedodontists, associated with government-controlled hospitals, clinics, polyclinics and school clinics, receive postgraduate training at the Institute for Progress and Specialization in Dentistry in Sofia.

All Bulgarian preschool and school children are examined twice a year, in the fall and in the spring. Required dental procedures usually are performed at the school dental clinic immediately after examination; only the extraction of permanent teeth or orthodontic treatment need permission of the parents. In those instances the parents may select a practicing dentist or the school dentist.

The incidence of dental caries and periodontal disease in Bulgaria is significantly lower than in the West European countries. Almost 65 per cent of the school children examined in 1959 were free from carious lesions.

The drinking water of most Bulgarian districts has a low fluorine content; however, 190 towns and villages have water supplies with a high fluorine content. In about 400,000 Bulgarians, endemic dental fluorosis was diagnosed in 1959. Many of the mineral springs contain between 0.8 and 22.0 ppm fluorine. The Bulgarian Public Health Service, therefore, declines to introduce compulsory caries-preventive procedures such as the fluoridation of community water supplies, topical application of fluorine (fluoride ion) compounds or administration of fluoride tablets; the Health Service advocates strongly the routine use of the water from these mineral springs for drinking purposes.

Experiments made at the Dental College of the University of Sofia have demonstrated clearly that the uninterrupted intake of water from these mineral springs by pregnant women, infants, preschool and school children reduces the incidence of caries by about 35.6 per cent.

In the rural regions having a water supply poor in fluorine, school dentists apply to the teeth a paste which consists of 75 per cent sodium (or calcium) fluoride and 25 per cent glycerin and menthol (Lukomsky's paste) twice a year. During the period from 1955 to 1959, more than 500,000 school children were treated with this paste. Convincing evidence of the benefit of this treatment, however, is lacking.

Both Bulgarian dental schools, the Institute for Progress and Specialization in Dentistry and the Dental College of the University of Sofia, offer graduate and postgraduate courses in school dentistry and pedodontics.

The satisfactory and close cooperation between the public health officers and the members of the dental and medical professions (especially pediatricians and pedodontists) is a characteristic feature of the Bulgarian public health program.

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Anatomy

The unilateral distribution of epipteric bones

James Aitchison. *Brit.D.J.* 109:55-58
July 19, 1960

An epiteric (epipteric) bone is a small wormian bone sometimes seen between the great wing of the sphenoid and the interparietal bone; that is, in the region of the sphenoparietal suture, where the posterior part of the superior border of the great wing of the sphenoid articulates with the anteroinferior angle of the parietal bone.

The sites and sizes of wormian bones are important to the dental profession because of the prevalence of these bones in cleidocranial and craniofacial dysostoses. Wormian bones also are of interest in anthropology in the study of apes and of the skulls and ancient and modern hominids.

A study was made of 100 human skulls in the author's private collection, at the Royal College of Surgeons of Edinburgh, and at the Royal College of Surgeons of England. Some skulls showed only one epiteric bone whereas others had several.

In the 100 skulls, 41 epiteric bones were found on the left side only, 3 epiteric bones on the right side only; 7 skulls had epiteric bones on both sides and 49 skulls had no epiteric bones.

The preponderance of epiteric bones on the left side recalls the observation of Elliott Smith that in right-handed people the occipital pole of the left cerebral hemisphere is the larger, and therefore projects more in a backward direction than the right hemisphere. In left-handed persons the opposite condition prevails.

Clinicians will not accept the theory that the use of the right or left hand can be deduced from the shape of the skull, but will be prepared to accept evidence of right-handedness from factors in other bones, such as those of the hand.

So many of the 100 skulls used in this study did not contain full dentitions that it was not possible to note any correlation of epiteric bones with unilateral variations in occlusion.

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The tubercle of Carabelli in the Kish dentition, Mesopotamia, 3000 B.C.

Virginia M. Carbonell. *J.D.Res.* 39:124-128
Jan.-Feb. 1960

The Carabelli tubercle, described by an Austrian dentist, Georg Carabelli, in 1831, is a small tubercle occasionally appearing on the lingual surface of upper permanent molars, opposite the anterointernal cusp. The tubercle is found most often on the upper first molar and very rarely on the upper third molar. The tubercle, when found on the second molar, is not as prominent as its mesial counterpart. The carabelli tubercle generally is bilateral in the dentition, rarely unilateral.

As part of a study on the morphology of the dentition of skulls from the period around 3,000 B.C. from Kish, Mesopotamia, the incidence of the Carabelli tubercle was recorded. Forty-seven maxillary right first molars and 48 maxillary left first molars were available for examination.

Twenty-three per cent of the right molars exhibited the Carabelli cusp in varying sizes, and in 24.4 per cent of the left molars the cusp was observed in the same variation as in right molars. In only one instance was a fully developed cusp observed bilaterally on the first and second molars.

Of the 45 maxillary right second molars and 36 maxillary left second molars examined, the Carabelli cusp was found on 2.4 per cent of those on both right and left.

None of the 28 maxillary right third molars and

24 maxillary left third molars had a Carabelli tubercle.

The comparative data gathered from the American, European and Mongoloid people indicate that the Carabelli cusp is an anomaly inherent largely in modern white people of European origin.

The absence or low incidence of the Carabelli tubercle in Mongoloid groups indicates that genetic mechanisms are involved in its occurrence.

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An electromyographic study of the function of the lateral pterygoid muscle

Antti Ekholm and Hannu S. Siirilä.
Suomen hammaslääk.toim. 56:90-106 June 1960 [in English]

The function of the lateral pterygoid muscle in the movements of the lower jaw has been the subject of theoretical conjecture only because of the muscle's deep location in the infratemporal fossa. Conceptions of the muscle's role in the opening and closing movements of the lower jaw have been completely contradictory. This electromyographic study was carried out on 15 dental students. The following conclusions were reached:

The main function of the lateral pterygoid muscle is to move the lower jaw forward in simultaneous bilateral action. The unilateral activation of the muscle causes a lateral movement of the jaw. The activity of the lateral pterygoid muscle is not absolutely necessary in the opening of the jaw, although in the habitual opening the muscle is a contributing factor, and probably facilitates the opening by moving the condyle into a more favorable position.

Some persons can open the jaw nearly 3 cm. without the lateral pterygoid muscle being activated, by keeping the jaw in compulsory retrusion during the movement. The translation of the condyle in this movement then occurs passively as a hinge movement, although the transverse axis of the movement does not pass through the condyles.

The activity of the muscle in the habitual opening movement commences in different persons at different times. The position of the head affects the moment of activation so that when the head is inclined forward, the activity in some individuals commences somewhat earlier, and when the head is inclined backward, later than in the upright position. With the jaw in habitual rest position no activity in the lateral pterygoid muscle was established with concentric bipolar electrodes, except for the insertion potential.

During occlusion the muscle generally is involved only if the subject bites against an imagined or real obstacle, especially when the jaw is in protrusion.

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Biochemistry

A biochemical pattern basic to tooth decay

Naomi C. Turner. *J.A.D.A.* 61:20-31 July 1960

In research into the process of dental caries, the role of sugar may have been overstressed and that of starch understressed. One phase of the dental decay process may be concerned with the manner in which a person's enzymes handle starch.

In the three year longitudinal study reported, the subjects were 170 children seen on a recall basis every six months for three years, at the Forsyth Dental Infirmary for Children. Their age range at the end of the three year period was 6 to 15 years. Saliva was collected from each child and tested for dextrinizing time, chloride content, buffer capacity and for the titratable acidity developed from saliva-cornstarch in a two hour incubation period at 37°C.

The results indicate that the biochemical profile of a person subject to much dental decay may be characterized by an amylase system which breaks starch down rapidly, maintains a high salivary chloride level and is low in buffers to handle acid production from carbohydrates.

The biochemical profile of a person free from dental caries shows an amylase system slower to break down starch, a lower salivary chloride level and a high complement of buffers to remove acids developed in the degradation of carbohydrates.

Tooth decay may be conceived as the result of a metabolic fault expressed through genetically determined human enzyme systems. This study suggests that some such enzyme systems are detrimental and some are protective to tooth structure. For those enzyme systems whose product is detrimental to tooth structure, excessive intake of their substrate (starch) leads to further increase of the enzyme. If physiologic buffers are not present in sufficient amount to act as a balancing factor to the excessive acid developed by fast-acting amylase, tooth decay is even more extensive and rapid.

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Distribution of fluoride in teeth from areas with different levels of fluoride in the water supply

S. H. Yoon, F. Brudevold, D. E. Gardner and F. A. Smith. *J.D.Res.* 39:845-856 July-Aug. 1960

This study was undertaken to investigate the deposition of fluorine in surface and subsurface tooth material. Concentrations of fluorine were determined in layer samples of enamel, crown dentin and root dentin of erupted permanent teeth of persons of varying ages who had resided continuously in communities with known but different concentrations of fluorine (fluoride ion) in the water supply. The various water supplies contained 0.1, 1.0, 2.9, 3.0 and 5.2 ppm fluorine.

The following conclusions were reached:

1. The concentration of fluorine in successive layers of enamel decreased from the surface inward and tended to level off in the mid-portion of the enamel toward the dentinoenamel junction.

2. The level of fluorine increased in all portions of the enamel with increasing levels of fluorine in the drinking water.

3. The concentration of fluorine increased with advancing age in the outermost enamel but not in the principal portion of the enamel.

4. Higher concentrations of fluorine always were found in the surface layers of dentin (pulpal dentin) and in the root surface (cementum) than in the inner dentinal portions.

5. A greater increase in fluorine was observed in dentin than in enamel with increasing concentrations of fluorine in drinking water.

6. There was a pronounced increase with age in the concentrations of fluorine in the pulpal portion of dentin and in the root surface.

7. The concentration of fluorine in dentin was greater than in enamel, with the exception that more fluorine was found in the outermost portion of the enamel than in the bulk portion of dentin.

Harvard School of Dental Medicine, Boston, Mass.

Figure 1 Initial cuts are made with this high-speed tooth cutter. The motor and saw are mounted on a standard milling machine base

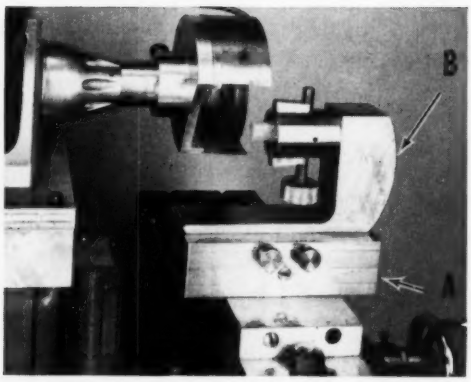

Figure 2 The saw and specimen-holding chuck. The base (A) rotates 360 degrees horizontally and the chuck (B) rotates 120 degrees vertically

Figure 3 Microradiogram of human tooth 90 microns thick. The tufts are outlined clearly at the dentinoenamel junction

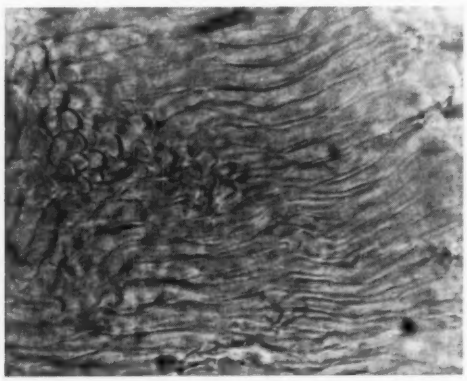

Figure 4 Microphotograph of ground section of human tooth 20 microns thick. In the enamel, the prisms are clearly visible

Histology

Methods and techniques in the preparation and microradiography of mineralized tissues

C. W. Miller, J. T. Istock and H. W. Lyon. *J.D.Res.* 39:982-989 Sept.-Oct. 1960

A relatively simple but rapid method for preparing ground sections of mineralized tissues for microradiographic study is described.

Prior to cutting, fixed or fresh bones and teeth are freed of all external soft tissue. No other preparation is required.

With a cutter of simple design (Fig. 1), initial cuts of about 100 microns in thickness are made. Initial cuts as thin as 50 microns have been obtained. An electric motor with governed speeds ranging from 5,000 to 45,000 rpm is mounted on a standard milling machine base. The micrometer control permits precise selection of specimen thickness. Steel blades 3.5 inches in diameter and 0.010 inch thick, with 48 teeth per inch, are used. The cutting edge of the blade is cooled by a continuous stream of cold water.

The specimen holder (Fig. 2) can be rotated 360 degrees horizontally and about 120 degrees vertically. This enables the operator to select different angles for cross, longitudinal and oblique sections.

To cut serial tooth sections 75 to 100 microns thick, a speed of 6,000 rpm is used. Cutting time is 20 minutes per section.

After the specimen has been cut, it is lapped by hand on the abrasive surfaces of frosted plate glass and moistened with 95 per cent ethyl alcohol. Lapping reduces the sections in thickness and removes minute scratches and scars from the surface. Specimens then are stored in 95 per cent ethyl alcohol until ready for use.

Sections selected for microradiography are removed from the alcohol and air dried for about ten minutes. Each dried specimen is placed in direct contact with the emulsion and covered with 0.00045 inch of aluminum. The covered packet is placed on target 10 cm. from the beam window. The x-ray unit is a standard commercial generator with a beryllium window tube. It is a compact unit with a working range of from 5.5 to 50 kvp and current range of from 0 to 60 ma. The unit is water-cooled and designed for continuous operation.

The selected film—Eastman Kodak spectroscopic plate 649 GH—has a resolution of about 1,000 lines per millimeter. After exposure, the spectroscopic plate is developed in a high resolution developer at 68°F. for seven minutes, then placed in an acid fix. The process is completed by washing in running water for five minutes, then drying in an atmosphere which is free from dust.

Figure 3 is a microradiograph of human tooth, 90 microns thick, and Figure 4 a microphotograph of a ground section of human tooth, 20 microns thick.

Naval Medical Research Institute, Bethesda, Md.

Observations on the development of oxytalan fibers in dental granulomas and radicular cysts

Harold M. Fullmer. *Arch.Path.* 70:59-67 July 1960

The presence of connective tissue fibers, distinct from collagenous, reticular and elastic varieties, has been described in the periodontium of mice, rats, guinea pigs and man. These fibers have been named oxytalan in acknowledgment of their resistance to acid solubility.

Dental granulomas are masses of granulation tissues in various stages of repair. They develop at the apexes of teeth in response to the invasion of microorganisms of the carious process after it has progressed through the crowns and pulps of teeth. Radicular cysts are presumed to originate from dental granulomas. They possess an epithelial lining believed to arise from the numerous epithelial cell rests of Malassez normally present in the periodontal membrane, whose growth is stimulated by the inflammatory process.

A study was made of the development of oxy-

talan fibers in 21 radicular cysts and dental granulomas. The peracetic acid-aldehyde fuchsin-Halmi staining reaction for oxytalan fibers (Fullmer and Lillie, 1958) was used; apparently it demonstrates a mucopolysaccharide in developing dental granulomas and radicular cysts that is not visualized with either azure A or the Hale (Rinehart) stain.

Oxytalan fibers develop in dental granulomas and radicular cysts in a fashion analogous to that occurring during embryogenesis.

Since oxytalan fibers are formed normally in the periodontium and develop anew under pathological conditions, it is suggested that the demonstration of these fibers in a lesion from the jaw indicates the periodontal origin of those connective tissue cells that produced the fibers. For this reason the peracetic acid-aldehyde fuchsin-Halmi and the peracetic acid-orcein-Halmi stains should be useful diagnostic aids to the pathologist.

National Institute of Dental Research, Bethesda 14, Md.

A comparative histochemical study of elastic, pre-elastic and oxytalan connective tissue fibers

Harold M. Fullmer. *J.Histochem.& Cytochem.* 8:290-295 July 1960

On the basis of histochemical and enzymatic reactions, oxytalan connective tissue fibers have been shown to be a distinct fiber type separable from the collagenous, reticular and elastic varieties. A comparative histochemical study of oxytalan and elastic fibers in the periodontiums of several mammals was undertaken to clarify further the relationship of oxytalan to elastic and other connective tissue fibers. The material consisted of specimens from the upper and lower jaws of mice, rats, albino guinea pigs, a rabbit, a deer, a steer, a dog, a sheep, a monkey, a hog, and three human fetuses.

The results support the idea that oxytalan fibers are a type of incompletely developed or specially modified elastic fiber. The proportion of elastic to oxytalan fibers varies with (1) the species, (2) the type of tooth, and (3) the location about the tooth.

Oxytalan fibers are present in connective tissue structures that require little or no elasticity. In these sites, such as periodontal membranes and tendons, it is plausible to assume that the development of characteristic elastic tissue either is not required or may be detrimental to function and that therefore an altered or incomplete elastic structure is formed.

On the basis of present histochemical methods, pre-elastic fibers cannot be differentiated from oxytalan fibers.

It is proposed that the term oxytalan fibers be used to designate elasticlike fibers in certain structures that in an adult state never develop into characteristic elastic fibers, and that the term pre-elastic fibers be used to designate either developing elastic tissue in structures in which it can be expected to undergo maturation into characteristic elastic fibers, or be applied to extensions of recognizable elastic fibers.

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History

Dentistry in Buenos Aires at the beginning of the nineteenth century

Diego B. Bagur. *Rev.A.odont.Argentina* 48:137-142 May 1960

All the activities connected with dentistry during the first 20 years of the nineteenth century were only a continuation of those that had prevailed in and around Buenos Aires at the end of the preceding century, with the same characters, that is, the bloodletters, the barbers, and the College of Physicians, or Protomedicato. In contrast with the bloodletter or the barber—often a slave—the dentist, who made his almost permanent appearance after 1810, brought with him a different professional concept which distinguished him from his competitors. He, too, however, often combined his art with other offices.

In the license granted on Feb. 26, 1783, to Gabriel Ronsil, the first dentist to practice in Montevideo and Buenos Aires, by which he was required to teach the methods of extracting teeth and molars, as well as those of cleaning, filling, and treating them in their various diseases, we find the outlines of a new profession. His activities were wider in scope than those of the earlier practitioners (the bloodletters and barbers), all of whom were concerned only with exodontics.

The barber-phlebotomist, however, survived throughout the whole of the nineteenth century and into the beginning of the present, in spite of efforts to combat the dangers and abuses of quackery. Professional bloodletters, on the other hand, had a somewhat different status. In common with physicians, surgeons, and apothecaries, they were under the control of the Protomedicato, which required them to undergo examination or submit their licenses for approval. They occupied a position of comparative importance and worked side by side with physicians and surgeons in colonial hospitals, where their functions included bleeding, cupping, applying leeches, and extracting teeth. Later on, they became known as phlebotomists, rather than bloodletters, and some were accepted as dentists.

Dental procedures during the colonial epoch were limited to exodontics and the use of a great variety of medicaments. Some of these represented the judicious application of certain medicinal plants, but there were also many curious concoctions and magic remedies based on empiricism or charlatanism. In the history of those times, it is often hard to distinguish the boundaries between medical knowledge in the hands of surgeons and professional bloodletters on the one hand and popular fancies on the other, impregnated as they both were by the astrological and magical ideas which had for centuries influenced not only daily life in Europe, but also the art of medicine itself.

Working on a plane above these partial manifestations of dentistry, the dentist, properly so called, practiced exodontics, prosthetics, and dental surgery; he had some idea of orthodontics; he knew the diseases of the mouth and the disturbances of dentition; he emphasized the importance of oral hygiene; and in all of these he was guided by a more complete and scientific knowledge of anatomy and physiology.

The interest in oral hygiene shown by the people of Buenos Aires in the early nineteenth century must be attributed in part to the influence of the dentists who, beginning with Benito Ramirez in 1810, came to establish themselves in the city. In an announcement in the *Ministerial Gazette* of Buenos Aires, dated Nov. 16, 1814, Ramirez, the second dentist to come to Argentina and the first to practice there almost continuously, though he did make journeys to other South American countries, described himself as a professor of the dental faculty and made known his skill in the various forms of dentistry, from the simple cleaning of teeth to their extraction and replacement with well-fitting dentures. His patients must have been satisfied, because he was successful in his practice. In a later announcement, published in 1832, he expressed his "gratitude to the great city which had sustained him without want throughout the long period of twenty-two years."

Libertad 543, Buenos Aires, República Argentina

Public health dentistry

Fluorine content of bread

Angela Schait-Bonissone. *Helv.odont.Acta* 4:39-40 April 1960 [in French]

The fluorine (fluoride ion) content of certain foodstuffs may supplement the fluoride supply provided by the intake of fluoridated drinking water, milk and salt or by administration of fluoride compounds (topically or in tablet form). The caries-reducing effect of fluoride on teeth and bones may be enhanced by consumption of bread containing fluorine, although it may be argued that bread intake is begun too late in life to be of essential benefit to the teeth.

Twenty-four brands of bread (crumbs and crusts), available in Zurich, Switzerland, were chemically analyzed as to their fluorine content at the Dental Institute of the University of Zurich.

The values ranged between 0.02 ppm fluorine per Kg. dry weight (crust of whole wheat flour bread) to 2.18 ppm fluorine per Kg. dry weight (crust of a specific rye bread, produced in Wallis). There was no statistically significant difference between the fluorine content found in the crumbs of the various bread brands and that found in their crusts.

Dental Institute of the University of Zurich, Switzerland

Influence of psychic trauma on the production of dental caries in the rat

Honorato R., Oberti C., Chayet C., Aranki A., Guerrero S. and Giuliucci A. *Rev.dent.Chile* 50:5-8 Jan.-Feb. 1960

For some time it has been known that dental caries can be produced in rats by feeding them a diet rich in sucrose. The experiments herein reported were designed to show the effect of psychic trauma (stress) on the characteristics of caries in rats maintained on a diet rich in sucrose.

Immediate stress was induced by separating the mother rat from her newborn litter every seven days, repeating the separation four times in a month. On the day of separation, the animals were given water but no food. Stress was further produced in animals weighing 60 Gm., more or less, by keeping them on the following schedule: food for four days, no food on the fifth day, food on the sixth day and no food on the seventh day, and repeating this cycle. On the days without food, a piece of cheese was placed above the cage, out of reach of the animal but close enough to make him try to get it.

The results obtained show that interruption of such a cariogenic diet for 24 hours produces a remarkable decrease in the incidence of dental caries.

No satisfactory explanation for the mechanism of this action could be deduced from these experiments, but the fact should be taken into consideration in future work on this problem.

The influence of early stress (in the newborn) on the number of animals with caries and on the incidence of caries in each animal was plainly evident. This influence probably is exerted by the anterior hypophysis-suprarenal route.

In any event, it has been demonstrated that caries is not the result of a strictly local process but that there are general factors involved. The possibility that caries has its internal starting point in a thrombosis which acts either primarily or in conjunction with the local external cause, however, cannot be excluded.

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Incidence of dental caries in Yugoslavia: the role of dental research

Zdenko Njemirovskij. *Stomat.Glasnik Srbije* 60:5-18 Jan.–March 1960

The radical socioeconomic changes in Yugoslavia which occurred after the liberation from the German occupation appear to have produced an increase in the incidence of caries in the entire country.

Yugoslavian dental researchers have been occupied mainly in accumulating statistical and epi-

demiological data on the prevalence of caries in certain districts and communities and less with the investigation of methods available to reduce the incidence of caries. At present, the staffs of the few scientific research laboratories of the dental schools are occupied with more or less theoretical investigations of tooth structures and of the oral tissues. Adequate cooperation between the Yugoslavian dental industry and the dental research laboratories, however, has been established.

At the clinics associated with the dental schools, newly developed methods and technics are being investigated to determine their applicability to orthodontic, pedodontic, periodontic, prosthodontic or general dental practice.

Great efforts are being made by the government through its public health agencies, by the dental profession through its national or local organizations, and by the dental schools through their consulting and treatment facilities, to organize an excellently functioning nationwide dental health service program. Certain steps have been taken and others are being planned to initiate caries-preventive procedures (fluoridation).

The creation of a National Institute for Dental Research is planned. It will consist of three independent departments as follows:

1. The department of caries epidemiology with sections for (a) statistical analysis of the incidence of caries; (b) caries prevention; (c) improvement in oral hygiene, diet and nutrition; (d) reducing the occupational hazards; (e) investigation of the relations between climate and the caries incidence, and (f) prevention of periodontal disease.

2. Department of caries pathology with sections for (a) biochemical and pathophysiological investigations; (b) bacteriological and histopathological investigations, and (c) investigations of dental materials, dental remedies and new methods in dental treatment.

3. Department of public dental health service with sections for (a) organization of dental care programs, and (b) initiation of caries-preventive procedures.

The Institute will serve as an advisory council to the federal health authorities and will publish reports periodically on its activities designed to inform the governmental agencies, the dental organizations as well as the general public about dental health programs and caries prevention procedures in the planning stage or already initiated.

Dental School, University of Zagreb, Yugoslavia

Pathogenesis of dental caries: endogenous factors

Paolo Albanese. *An.españ.odontoestomat.* 19:87-103 Feb. 1960

The experimental studies of several authors have shown that there is an exchange of fluids between the buccal cavity and the dental pulp. Such studies support the theory that the carious process may be initiated when the balance of this exchange of fluids is disturbed, as it may be, either by external stimuli or those that are endogenous.

From the reports of Leimbruger and Thomas, it appears that the predisposition to destruction of the hard tissues of the teeth, including the enamel, by exogenous pathogenic agents depends on dietary inadequacies. These lead to a pathologic alteration in the saliva, which contains pathogenic ions such as thiocyanate, sodium and manganese, and antagonistic ions such as phosphorus, calcium, potassium and fluorine. To the recognized factors—vitaminic, hormonal and neurologic—governing the metabolism, should be added the actinic, which plays such an important part in the metabolism of calcium, a basic element in the formation of the hard tissues of the teeth.

The influence of the hormonal and neurologic factors has been confirmed by Selye's studies of the general adaptation syndrome and by studies dealing with the pathophysiology of the diencephalon. In this connection, Speranskij has conducted experiments showing that dental changes accompany diencephalic lesions of various origins —morphine intoxication, virus encephalitis, tuberculosis, or neoplasms. These changes support the principle established by Speranskij that disturbances of the nervous system promote the disease but are not the specific cause of it.

These various studies substantiate the author's proposal of a new theory to account for dental caries. This theory, which takes into consideration not only pathogenic conditions in the organism

but pathogenic agents, is termed the "neurotrophomicrobial" theory of dental caries.

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Biased criticism of fluoridation

James M. Dunning. *Nutrit.Rev.* 18:161-165 June 1960

Public health measures should be able to stand up to searching criticism. It is important to the public that such criticism should exist and should be met. However, criticism should be fair, should present mistakes or inadequacies in their proper relationship to accomplishments, and should not present conclusions to the public which are unwarranted by the evidence. The occasion for these remarks is the publication of an 83-page booklet, *Fluoridation, Errors and Omissions in Experimental Trials,* by Philip R. N. Sutton, a senior research fellow at the University of Melbourne Dental School. The booklet analyzes the printed reports of the long-term pilot studies of water fluoridation made in Grand Rapids, Mich.; Evanston, Ill.; Brantford, Ont., and Newburgh, N.Y.

A few errors and omissions are pointed out which might have been avoided. Two or three valuable suggestions for future pilot studies are offered. The bulk of the material, however, comprises criticism of a minor or irrelevant nature with no attempt to appraise the large accomplishments and extraordinarily comparable results of the four fluoridation projects.

Sutton's criticism deals chiefly with four aspects of project design: adequacy of controls, randomization of sampling procedure, adjustment of sample size to compensate for variability in caries attack rate, and variability or bias of examiner.

Sutton criticizes the selection of Kingston as a control for Newburgh because there are differences in calcium, magnesium and hardness of the water between the two cities. Yet only with the third of these characteristics is there even a hint of evidence that it may be related to caries attack rate. Even if a relationship were known to exist in all three characteristics, the matter would be irrelevant if the balance of other factors brought it to pass that initial caries rates were roughly similar in the two cities before fluoridation, which was indeed the case.

Sutton apparently is unfamiliar with the principle of stratified sampling designed to handle situations where randomization alone could produce biased results. Thus he criticizes the selection of representative schools in the large city of Grand Rapids and the examination of "almost all schools" in Muskegon, a smaller city. He criticizes the Evanston study because white children in the control area (Oak Park) were compared with white children in Evanston instead of white and colored children (Negroes have a different caries rate). The randomization Sutton suggests would have introduced errors instead of eliminating them from the studies.

From Sutton's comments on examiner variability, it seems nothing will satisfy him except the continuous employment of a small number of examiners for the ten-year period of study. Yet, the studies were under continuous supervision and, if examiners changed, the new examiners were oriented and their work standardized by the supervisor. Sutton makes the good suggestion (though difficult to carry out) that a possible source of bias residing in the fact that the examiners knew in which city they were operating might be eliminated by transporting to a common examination center children from both cities, so that the residence of the child might be unknown to the examiner. He shows bias of his own, however, in refusing to credit the fact that roentgenograms of Newburgh and Kingston children, randomized by code number, showed results of the same order as those made by the clinical method in each city.

If Sutton had visited with an open mind such cities as Newburgh and Kingston, as this writer has done recently, he would see such obvious differences in children's mouths that he would stop looking for "slips in arithmetic, typographical errors, unsophisticated statistical analyses, and minor inconsistencies between preliminary and final reports or between observer teams."

It is tragic that Sutton's booklet will be read by a public often unable to appreciate its defects or learn in detail the other side of the matter. The booklet will be used by unprincipled agitators to arouse fears where fluoridation is up for community decision.

The booklet will delay further the fluoridation of municipal water supplies in Australia, with the result that many thousands of Australian children will needlessly develop dental caries and suffer the pains of toothache and infection unnecessarily.

Harvard School of Dental Medicine, Boston, Mass.

Effect of consistency of diet on bacteria in gingival pocket in dogs

B. Krasse and N. Brill. *Odont.Revy* 11:152-165 June 1960

The effect of the consistency of the diet on the bacteria of gingival pockets in four dogs was determined.

During a preparatory period, the animals were fed a soft, sticky diet. At the end of this period, samples were taken from 105 gingival pockets in the four dogs; 77 of the 105 samples (73 per cent) showed growth on culture. All four dogs had abundant calculus and plaques.

The teeth were scaled and cleaned and the animals were placed on a hard, tough diet (dog biscuits and boiled bovine trachea) for four weeks. Only 35 of 105 samples of material collected (33 per cent) from the gingival pockets showed growth.

When the consistency of the diet was such as to require strong mastication, specimens from the gingival pockets relatively seldom gave growth on culture. When the consistency of the diet was again changed so that the diet did not require mastication, the number of gingival pockets from which specimens gave growth increased significantly, and a distinct change was observed in the qualitative composition of the flora.

During the period the animals were on the hard diet, the bacterial population represented a typical mixed flora with abundant coliform rods. When the animals were afterward placed on a soft diet, the picture of the flora was dominated by fusiforms and spirochetes.

The fact that a soft, sticky diet can result in changes in the gingiva usually is ascribed to the assumption that the formation of plaque produces local trauma or irritation. Another mechanism also appears to be important: a vigorous mastication can stimulate an increased flow of tissue fluid from subepithelial compartments into the gingival pockets and this can in turn mechanically remove bacteria from the pockets.

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The ineffective toothbrush

Lancet No. 7142:142 July 16, 1960

The design of the toothbrush has changed little in the past 130 years. A plate in F. Maury's treatise on dentistry, published in 1843, shows that even then almost every shape of brush had been thought of.

In 1956 in Great Britain less than 25 million toothbrushes were sold for 35 million potential users. Members of the public are loath to pay more than about two shillings [28 cents] for a brush, thus restricting enterprise by the manufacturers. Advertising has little effect on sales, but branded makes by well-known firms sell more readily than unknown makes.

Some new approach to toothbrushing is needed, and this has been made by B. L. Archer and others (1960) who have produced some interesting variants on the conventional brush. One is a portable brush in a cylindrical case which carries a supply of tooth paste. Another is a disposable brush, the semiflexible handle of which contains paste that can be forced through a small nozzle among the bristles. An even more unorthodox design has no bristles; the cleansing is done by a series of small nozzles supplied with water from the bathroom tap. The authors suggest that a small block of detergent could be incorporated in the handle to make the instrument more pleasant and effective.

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The ineffective toothbrush

J. L. Patton. *Lancet* No. 7144:267 July 30, 1960

The toothbrush fails because teeth are not rigid structures fixed rigidly in bone, but are rigid structures sitting in an elastic bed on the bone. Food debris that has become impacted between teeth can be removed only by the use of a force

sufficient to overcome the elasticity of the periodontal membrane. For that reason, the toothpick must always be more efficient than any bristle yet devised.

There is a serious lack of evidence that toothbrushing has any beneficial effect on the incidence of dental caries. Investigations in England suggest that schoolgirls with their greater interest in the esthetic value of toothbrushing are almost twice as conscientious toothbrushers as schoolboys—but schoolboys often have better teeth.

A scientific assessment of the value of different methods of toothcleaning is needed.

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The use of systemic fluoride by American dentists

R. E. Dudenbostel, D. K. Grissom and S. S. Steinberg. *Pub.Health Den.* 20:13-14 Summer 1960

A postcard questionnaire relating to the use of systemic fluoride was sent to 97,848 American dentists, of whom 12,525 (12.8 per cent) responded.

Of the respondents, 31.3 per cent prescribe systemic fluoride for their patients living in areas where the public water supply is not fluoridated. Forty-six different commercial brands of systemic fluoride—19 in tablet form and 27 in solution form—are being prescribed. The tablet form is favored in a ratio of about 2:1. Of the dentists prescribing solutions, 83.2 per cent gave no brand or dosage for the various age groups. Of the dentists indicating that they "sometimes recommend sodium fluoride internally," only 23.7 per cent appear to follow the tablet dosages recommended by the Council on Dental Therapeutics of the American Dental Association. Of the dentists indicating that they "routinely recommend sodium fluoride internally," only 19.9 per cent appear to follow the tablet dosages recommended by the Council on Dental Therapeutics.

[In the same issue, Deward K. Grissom calls attention to the implications for public health dentistry of the afore-mentioned study. He states that with or without the leadership of public health dentistry, the use of systemic fluorides has become widespread. Only 20 per cent of the dentists involved are observing the approved dosage schedule. He asserts that public health dentistry should take the lead in setting minimum standards for the prescription of systemic fluoride, and should concern itself with the safety factor in the use of systemic fluoride.]

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Nutrition, diet, and calcium metabolism in dental health

Erling Johansen. *Am.J.Pub.Health* 50:1089-1096 Aug. 1960

The relationship between nutrition, diet and dental health is close and intricate—close because the etiological factors in dental disease are tied to dietary and nutritional considerations, and intricate because general body metabolism and aspects of bacterial metabolism enter the picture.

The systemic nutritional effect is mediated through the general circulation and is dependent on digestion, absorption and general metabolism. The local effect, on the other hand, is a localized, intraoral chemical or physical action of the diet and bacterial breakdown products of diet on the external surfaces of the teeth and the adjacent soft tissues. Degradation products of dietary carbohydrates and bacterial enzymes located on the tooth surfaces play important roles in the development of carious lesions. In the pathogenesis of periodontal disease, however, the role of dietary factors and bacteria is not as well understood.

The physical nature of the diet appears to be important. In the author's studies with hamsters, soft, powdered diets have been found to be conducive to periodontal disease, whereas hard, more fibrous diets appear to cleanse the teeth and produce only small gingival deposits. That the act of mastication is important in reducing calculus accumulation also is seen clinically in human beings.

Since periodontitis is an inflammatory response, it is unlikely that nutritional systemic disturbances as such will elicit the reaction. Rather, nutritional deficiencies must be thought of as altering the body's response to the noxious substances penetrating from the oral cavity.

Factors known to be of importance in the carious process include the oral bacteria, the saliva,

the tooth and food substances retained in the oral cavity. The relationship between nutrition and diet and salivary buffering capacity, ionic strength, pH, organic content, and so forth, and in turn the relation of these factors to caries initiation and progression need clarification.

In animal studies it has been shown that an increase in the protein and fat content of a cariogenic diet will be accompanied by a reduction in dental caries. Although the latter finding is of interest in understanding the mechanism of dental caries, it appears to be of little practical significance at this time in human caries control except in special instances. It would seem safe to assume that carbohydrates, particularly sugar, will continue to constitute an important part of our diet. Further caries prevention beyond that provided through water fluoridation and topical fluoride application and good oral hygiene most likely must be accomplished in the presence of sugar. Recent studies indicate that calcium and phosphate compounds may be of promise, but additional work is needed to clarify this question. There still are many gaps in our knowledge of the relation between nutrition, diet and dental health.

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Restorative dentistry workload of U.S. Air Force Dental Service

Lucian Szmyd and Clarence M. McCall, Jr.
U.S. Armed Forces M.J. 11:1011-1019
Sept. 1960

This investigation was undertaken to develop a method for estimating the restorative dentistry workload for enlisted personnel of the U.S. Air Force at base and command levels, and to analyze the present restorative dentistry workload for the U.S. Air Force Dental Service.

From data supplied by dental examinations conducted in 1958 on 26,369 incoming enlisted personnel at 48 Air Force bases, the mean number of restorations required for incoming enlisted personnel at each grade was determined. The average number of restorations required ranged from 6.77 for Grade A/B (average age, 18.9 years) to 1.62 for Grade M/Sgt. (average age, 38.5 years). It was estimated that 2,810,448 dental restorations would be required by the 724,956 U.S. Air Force enlisted personnel, or an average of 3.88 restorations per enlisted man. An additional 332,629 restorations would be required by officers.

In 1958, 1,762,680 teeth were restored.

The proportion of enlisted men needing restorative dentistry ranged from 89.7 per cent for the basic airmen to 56.6 per cent for the master sergeants. The restorative dentistry workload for basic airmen is almost identical with that reported by Hellman in 1957 for naval recruits (90.3 per cent).

Effectiveness of the Air Force dental program in reducing the required number of restorative procedures is evident only at the noncommissioned officer level; the Air Force dental program has little effect in reducing the mean number of restorations required for airmen in the lower grades.

The number of restorations required by the 201,000 dependents in overseas areas, and the annual increment of new carious lesions per person are additional factors to be considered in estimating the restorative dentistry workload. In 1958, incoming enlisted personnel needed 402,199 restorations.

A large discrepancy exists between the capability of the dental service and the number of tooth restorations required by Air Force personnel. Increasing this capability would reduce dental disease and loss of teeth from caries, and would constitute a major step toward improving the oral health of the U.S. Air Force.

The capability of the restorative dentistry section of the U.S. Air Force Dental Service should be greatly increased. Statistical studies of the workload of all sections of the Dental Service should be conducted and maintained. Consideration should be given to the computation of dental manpower requirements based on workload factors rather than flat ratios per military strength.

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Case reports

Relation between aphthae and endocrine function

Andreas Sohr. *Zahnärztl.Rundschau* 69:215 June 8, 1960

The possibility that a relation exists between the formation of aphthous lesions in the oral cavity and dysfunction or hypofunction of the endocrine system (mainly involving the adrenal glands) has been suggested by Denker-Albrecht (1952), Griebel (1954), Bürger (1953), and G. Fischer (1955). However, this theory has, as yet, not been generally accepted.

The author presents two case reports which seem to verify the hypothesis:

Case 1. A 55 year old woman appeared at the dental office for routine examination. Two years previously aphthae had occurred in the form of several ulcerating lesions about 20 mm. in diameter on the posterior portion of the palate and tongue. The lesions were oval-shaped and extremely painful. The patient was undernourished because the severe pain prevented proper masticatory function. She consumed only a liquid diet (mainly tea). Topical application of caustic lapis (fused potash) and spraying with chamomile extract were unsuccessful. During treatment of cystopyelitis (one year prior to the dental examination) she had received altogether nine injections of penicillin of 300,000 units each. Neither the cystopyelitis nor the aphthae responded satisfactorily to the therapy, although a temporary improvement in both conditions was observable. Later, the cystopyelitis disappeared after large doses of oxytetracycline and streptomycin were administered but the aphthous condition remained unchanged. After 10 months, spontaneously appearing symptoms such as bronzelike discoloration of the skin, physical and mental exhaustion, gradually increasing macrocytic and hyperchromic anemia, decreased blood pressure and disturbances in the gastrointestinal tract led to the medical diagnosis: Addison's disease. This disease is caused by hypofunction of the adrenal glands. Although the aphthous lesions had appeared long before the symptoms of Addison's disease, the treatment with an adrenocorticotropic hormone (Decorton), 10 mg. four times daily for three weeks, resulted in improvement of Addison's disease simultaneously with a disappearance of the aphthous lesions in the mouth. For five years, the patient has been free from aphthae.

Case 2. A 39 year old woman was examined orally at the author's dental office. Aphthous lesions, painful and resistant to local treatment, covered the palate, tongue and the floor of the mouth. A short time later, her physician made the diagnosis, Addison's disease, which was verified by histologic examinations made at the Medical Clinic of the University of Budapest. Treatment with adrenocorticotropic hormone, designed to improve the symptoms of Addison's disease, also improved the aphthous condition. For one year, no recurrence was observed.

Both case reports demonstrate that by insufficient function of the adrenal glands, aphthae in the oral cavity may occur. This type of aphthae is extremely persistent and appears earlier than the symptoms of Addison's disease. The author suggests that in all instances of severe aphthous lesions, the dentist should consult with a physician to determine whether the aphthae can be considered as an early symptom of Addison's disease. As in many diseases, an early recognition of Addison's disease may save the life of the patient.

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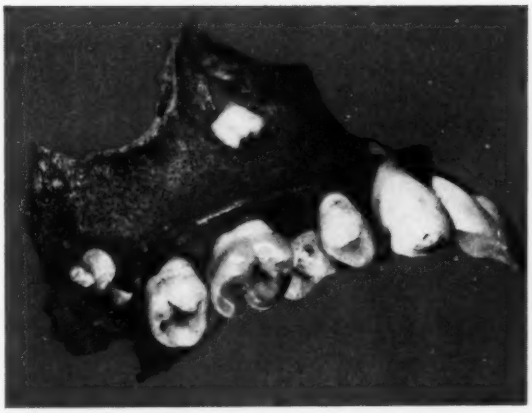
Primary tooth retention in the deciduous and permanent dentition

Th. E. de Jonge. *Tschr.tandheelk.* 67:429-437 June 1960

A study, undertaken at the anatomic-embryologic laboratory of the University of Amsterdam, The Netherlands, was concerned with two unusual instances of primary tooth retention.

In the first instance, the crown of an upper second deciduous molar—far above the level of its permanent replacement—was impacted in the canine fossa (Fig. 1). In the roentgenogram the



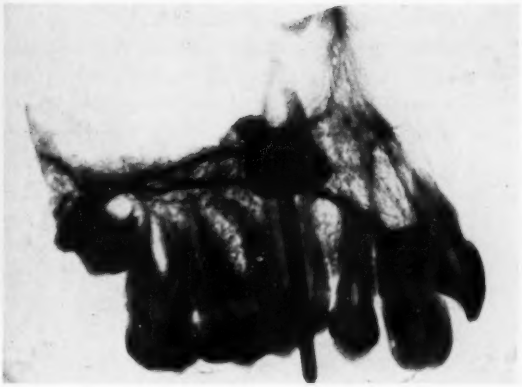


Figure 1 Photograph (left) and roentgenogram (right) of an instance of primary retention of an upper second deciduous molar impacted in the canine fossa

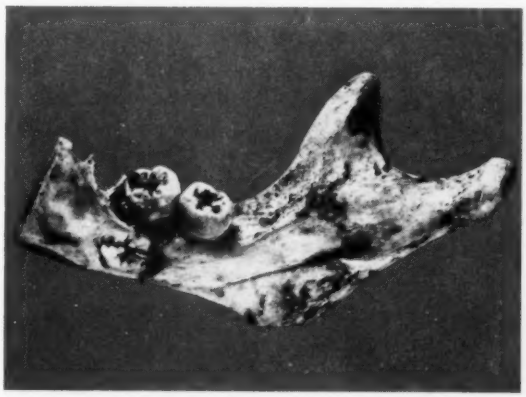


Figure 2 Photograph (left) and roentgenogram (right) of an instance of primary retention of a lower first permanent molar impacted in the mandible

anterior root of the impacted molar appeared to be inclined toward the anterior wall of the maxillary sinus, immediately beneath the infra-orbital foramen. The other two roots, in virtually horizontal deviation, had caused considerable elevation of the floor of the maxillary sinus. A round foramen, at the exact site of a broad interstitial space between the first permanent molar and first bicuspid, afforded an entry into a tubular and relatively narrow passage which constituted an almost vertical communication between the upper crest of the alveolar process and the masticating surface of the impacted molar.

Similar to the condition described in the first report, the second instance of tooth retention also was an instance of an orthotopic retentional position involving a lower first permanent molar.

The tooth, impacted in the right side of the mandible, appeared to be sharply tilted in an inward direction (Fig. 2). Only the two lingual cusps had partially perforated the cortical layer of the mandible. The crown of the impacted molar was completely developed. The roots, however, did not have the same developmental opportunity; they adhered to form a virtually shapeless unit.

Roentgenographic examinations revealed the presence of what was probably a congenital osseous defect on the upper crest of the alveolar process. The crown of the impacted molar was in the involved region of the bone.

In both instances, the cause of the deciduous tooth retention (acquired or hereditary factors producing an abnormal embryonic development of the tooth germs) could not be determined.

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Hypoglycemia: general considerations and report of a case

Nicholas T. Hallick. *New Mexico D.J.* 11:2:10-12 Aug. 1960

Hypoglycemia may occur as a complication or manifestation of a disease in its mildest form, or it may occur later and may be of grave import. The pattern of the clinical picture in hypoglycemia is varied, but in the same person the same symptoms tend to recur, though they may vary in severity. The attack usually takes place before breakfast or several hours postprandially. The blood sugar level at which the attacks occur varies. The rate of fall of blood sugar, the blood sugar level reached and the period of time over which the sympathetic nerve impulses are stimulated to increase the production of epinephrine affect the degree of severity of symptoms. The early symptoms of hypoglycemia when the decrease in the blood sugar is rapid are attributed to the "epinephrine response," and are identical in several respects with those produced by the administration of epinephrine. These symptoms are: fainting, tremulousness, hunger, apprehension, perspiration and cardiac palpitation, pallor, tachycardia and moderate elevation of blood pressure.

A 29 year old woman in no apparent distress appeared at the dental office for examination and treatment. Clinical and roentgenographic examination revealed a full complement of teeth, several with moderate to severe carious involvement. Periodontal tissues were within normal range. Dental hygiene was good.

Under local anesthesia (2 per cent procaine hydrochloride and epinephrine 1:50,000), operative procedures were completed, after which the patient complained of headache, dizziness and weakness and said she might faint. After ten minutes of rest the patient said she felt better and was dismissed.

At the next visit the patient reported that she had continued to feel weak until she arrived home and ate a small amount of food. During the second appointment, she exhibited the same symptoms but in a more severe form. Questioning elicited the information that the patient was hypoglycemic and that several years earlier a diagnosis of idiopathic hypoglycemia had been made and related to her. She had been told that epinephrine and similar substances used in local anesthetics in dental offices were contraindicated.

The use of epinephrine in local anesthetics can accentuate the symptoms of the hypoglycemic attack, since some of these symptoms are the result of epinephrine released from the adrenals in response to lowered blood sugar levels. However, if the condition is controlled by proper diet, vasoconstrictors may be used. This dental patient was on a high protein diet. In addition, the author recommended that she drink a glass of orange juice 15 minutes before her dental appointment, and that she take some carbohydrates at the conclusion of the treatment. Since these supplementary feedings were started, she has not exhibited any of the previous symptoms of weakness, trembling, headache or emotional instability.

Had a good medical history been obtained at the initial visit of this patient, perhaps some of her discomfort might have been avoided.

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Dietary deficiency of vitamin B_{12}

Martin S. Bourne and Samuel Oleesky. *Brit.M.J.* No. 5197:511-512 Aug. 13, 1960

A 40 year old nulliparous woman had been separated from her husband for 12 years. Until she became ill she had worked in an engineering factory assembling electric motors. Her chief complaints were angular stomatitis and a rough, sore tongue. Her weight had been steady and appetite good. Her diet contained no meat or poultry as she disliked these foods. She had fish once weekly, took an occasional egg or helping

of cheese, had milk in her tea, and used butter on her bread.

When first seen she was moderately pale and had some impetigo on the right cheek and soreness at the angles of the mouth. The tongue was smooth and red. The patient was given Becosym, a vitamin B complex, for three weeks without any benefit.

She was admitted for further investigations. The sternal marrow was found to be moderately cellular, and typical of a marrow of early megaloblastic anemia. She was instructed to add to her former diet 50 micrograms of vitamin B_{12} orally each day. After five weeks her symptoms disappeared and the sternal marrow was normal. Later a vitamin B_{12} absorption test showed an absorption of 7.8 per cent, which is well within normal limits. For six months thereafter the patient did not take any extra oral vitamin B_{12}. The symptoms did not return.

An average normal diet contains about 5 micrograms of vitamin B_{12} per day. Meat and fish are the main sources of dietary vitamin B_{12}. Milk, butter and cheese contain only the merest trace and there is a slight amount in egg yolk. Vegetable products contain none, and wheat has a trace. Thus, the patient's diet was greatly lacking in sources of vitamin B_{12}.

The most common oral symptoms in vegetarians are soreness of the mouth and tongue and paresthesia.

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Swelling of tongue

J.A.M.A. 173:972-973 June 25, 1960

Q.—On four or five occasions in the past two years, either on retiring for the night or on awakening in the morning, a patient noted that his tongue was swollen. On two of these occasions subcutaneous administration of diphenhydramine hydrochloride reduced the swelling and on the other occasions chlorpheniramine maleate and tripelennamine hydrochloride reduced it. Swelling of the tongue appears to be an allergic reaction. On the first occasion, the patient awoke with this condition while in a hospital. He was receiving continuous sacral tetracaine hydrochloride anesthesia for an acute arterial occlusion. He obtained relief within a few minutes after the administration of diphenhydramine. On the other occasions he was at home and not taking any drugs. No other allergic manifestations have been observed. What is the cause and treatment of this condition?

A.— The prompt administration of antihistaminic drugs, without exception, has brought relief from the swelling described. The description given would suggest the onset of angioneurotic edema of the tongue. The first episode would suggest that the anesthetic agent then being administered might have been a causative factor. Although allergy to drugs may have been responsible for the initial episode, other factors such as fatigue, tension, bacterial or parasitic infection or an allergic response to other allergens, particularly ingestants, may have contributed to that and subsequent episodes. A study of allergic factors probably would be of only limited, if any, value in the solution of this problem.

The following measures would seem to be indicated:

1. The patient should avoid the use of a para-aminobenzoic acid type of local anesthetic such as tetracaine if dental or other indications for local anesthesia should arise. Local anesthetic agents with a significantly different structure, such as lidocaine hydrochloride, usually are well tolerated by persons sensitive to the para-aminobenzoic acid category of agents.

2. The patient should carry on his person epinephrine hydrochloride for subcutaneous administration should additional reactions occur. There is a reasonable chance that the swelling in the tongue may extend into the throat and produce respiratory embarrassment.

3. The patient should carry on his person one of the antihistaminic drugs mentioned. This agent should be ingested promptly at the earliest evidence of swelling.

4. It should be ascertained that other medications, such as penicillin, have not been used, since allergy to other drugs might contribute to the problem described.

5. The patient should avoid fatigue and take adequate treatment for any infection.

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The dental research program in a Veterans Administration hospital

Irwin Walter Scopp. *Mil.Med.* 125:555-560 Aug. 1960

The directives of the Veterans Administration (VA) not only encourage research, but state that the best dental and medical care is found in hospitals engaged in research. The Chief of Dental Service has been placed on the research committee, together with the chiefs of other major professional services such as medicine, surgery, laboratory and psychiatry.

Dental research projects in VA clinics can be simple or complex. Among the simple projects that have been undertaken are the clinical testing of new drugs by the double-blind technic.

Statistical studies are easily undertaken because vast numbers of records and roentgenograms are available for compilation, projection and interpretation. Among such projects undertaken at the Veterans Administration Hospital in New York City is one investigating the effect of systemic disease on the periodontal structures, based on the study of roentgenograms of 169 men.

Complex research projects undertaken include the following:

1. A study of the effects of heat created by ultrasonic dental equipment on dental pulp.
2. A study of the effect of ultrasonic cutting tools on the pulp of erupted permanent teeth and unerupted teeth.
3. A study to determine whether the aging process is demonstrable in connective tissue by gingival biopsies.
4. An investigation of changes in oral cytology in cigarette smokers who had stopped smoking.
5. A study of the effects of tooth extraction in patients receiving bishydroxycoumarin.

Veterans Administration Hospital, New York 10, N.Y.

Albert Schweitzer Hospital in Peru

Th. Binder. *München.med.Wschr.* 102:1297-1299 June 24, 1960

With the aid of international funds, the author has built a hospital in the Amazon tropical jungle, 24 miles from Pucallpa, a Peruvian river port. The author was inspired by Albert Schweitzer to build the hospital with his own hands and native help, to operate it day and night under the most primitive conditions, and to fight leprosy, sleeping sickness and tropical disease.

Before the plan to build a hospital in the Peruvian jungle was made, the author studied the methods of Albert Schweitzer at Lambaréné in French Equatorial Africa. He observed Schweitzer's capacity for arduous physical and mental work and learned to understand the philosophy designed to lead to reverence for life as the true and effective basis for a civilized world. In gratitude, the author has named his hospital on the Amazon river after Schweitzer.

Dental and medical care is rendered continuously to Indians and mestizoes at the small hospital (24 beds). Among the native population, periodontal disease has a comparatively high incidence, but not dental caries. The worst disease is tuberculosis. Many patients suffer from skin diseases unknown in Europe and North America. Leprosy is prevalent. The present infant mortality rate is 80 per cent but is gradually decreasing. The Peruvian Indians and mestizoes are very fertile.

The author, who has been working in the jungles of the Amazon river since 1948, intends primarily to help those who are unable to help themselves. He established, equipped and maintained the hospital (which will soon be enlarged to 100 beds and will contain a dental clinic) chiefly from the proceeds of lectures given on his occasional visits to Europe and the United States.

To support him in maintaining this unique enterprise an association has been formed, "Aid for the Amazon Hospital Albert Schweitzer in Peru," Eppendorfer Baum 21, Hamburg 20, Germany. This association collects unsolicited gifts (medical or dental instruments and drugs) from private persons and grants from international foundations.

Amazon Hospital Albert Schweitzer, near Pucallpa, Peru, South America

Women in dentistry

Editorial. *Internat.D.J.* 10:182-183 June 1960

Women have practiced dentistry for centuries. When the Barber Surgeons Company of England received its charter in 1544, women were admitted on the same terms as men except for the wearing of livery. Women practiced dentistry in the United States in the Nineteenth Century. Lucy B. Hobbs was the first American woman to graduate in 1866.

Most women dentists are engaged in private practice, but in countries with well-developed public services they work part of their time in clinics. Women dentists have made their greatest contribution in pedodontics.

Although women now are well established in dentistry, some prejudice still persists among men who have had little to do with women professionally. Those who have taught or worked with women have a high opinion of their operative skill and reliability, and would welcome more women in the profession.

A recent survey of the role of women in dentistry by the Fédération Dentaire Internationale elicited information from 32 countries. Women today represent about 12 per cent of the profession. In seven countries more than 25 per cent of the dentists are women; Poland with 78 per cent and Finland with 77 per cent lead. Other percentages are: Greece, 48 per cent; Denmark, 40 per cent; Czechoslovakia, 38 per cent; Sweden, 28 per cent, and France, 26 per cent.

Women dental assistants serve as the dentist's "third hand" to save time and mental and physical energy. Although most dental technicians are men, in Sweden 50 per cent of such technicians are women. Dental hygienists have been trained in the United States since 1913. There are 34 training schools in the United States from which more than 10,000 dental hygienists have graduated, about half of whom still practice. Dental hygienists also work in Austria, Canada, Germany, Greece, Japan, Norway, Poland and the United Kingdom. The demand for the services of hygienists greatly exceeds the supply.

Dental nurses originated in New Zealand in 1923. They receive two years of specialized training in dentistry for children; today there are three training schools and 850 dental nurses, licensed to work only for the Department of Health under the control of departmental dentists. Dental nurses also are employed in Ceylon, Hong Kong and Malaya.

University of Liverpool, Liverpool, England

The dentist as a poet

Annemarie Schimmel. *CIBA Symp.* 8:88-91 April-June 1960

In the history of Islam, it is not uncommon to find physicians, dentists and veterinary surgeons who had distinguished themselves in the fields of the arts and philosophy. This creative combination is by no means confined to the classic age—there are examples in the more recent past and even at the present time, especially in Turkey.

In the first half of this century, it was a Turkish oral surgeon, Mehmet Akif, who in his poems provided his people with a new and forceful impulse toward religion, patriotism and health. He wrote a moving hymn to honor those who died defending the Dardanelles, and later, the national anthem of the new Turkey.

The younger generation of Turkish poets counts among its most distinguished representatives a practicing dentist and dental educator, Selâhattin Batu.

Born in Gallipoli in 1905, Batu studied at the School of Dentistry in Istanbul from 1921 to 1925, and two years after graduation was sent to Germany by the Turkish government. He taught at the dental colleges of Hannover and Berlin, and after his return to Turkey, he became a faculty member of the University of Ankara.

Batu's restless, active and scientific brain, reflected in the numerous papers which have appeared in the Turkish and international dental literature, represents only one side of his creativity. Batu was, until 1946, a regular contributor

to the literary magazine *Ankara*. As a member of the Republican People's Party, he was a representative of the Turkish parliament, and he still contributes articles on cultural problems to the leading Turkish political and literary magazines.

Batu not only has written poems and plays beloved by the Turkish people, he has translated classic and modern works of German, Greek and Scandinavian writers.

Selâhattin Batu has emerged as one of the leading personalities of our time, conscious of an overpowering need to heal the wounds of our age or, at least, to point the ways by which these wounds may be healed. The Turkish people recognize the debt of gratitude owed to Batu, the eminent poet with a generous human heart, who represents the best tradition of Turkish and German dentistry and who may be regarded as a symbol of humanistic philosophy penetrated by a sincere religious conviction and recognizing neither national nor denominational borders.

Ludwig Rehn Strasse 14, Frankfurt/Main, Germany

Errors of medical studies

George L. Saiger. *J.A.M.A.* 173:678-681
June 11, 1960

With an increasing number of new chemical and biological preparations on the market, the health professions are faced with the problem of having to rely on studies that produce results in a relatively short period of time. It has become important that investigators exercise more care in planning and executing their studies, in analyzing the results and drawing conclusions from them, and in reporting these results and conclusions in the literature.

Frequent causes of error in research articles are sampling bias, absence or inadequacy of controls, unwarranted conclusions, ignoring the period of exposure to risk, improper interpretation of associations, failure to appraise the appraiser, and failure to investigate or report adverse effects.

To gauge the uncertainty of an inference, the researcher cannot exercise any prejudice or bias when he selects a sample. To select without bias is to allow every subject an equal and independent chance of being included in the sample. This is known as random sampling; the word "random" refers to the method by which the sample is chosen and not to the sample itself. Even though a random sample is not necessarily a characteristic sample, it provides the only means by which the uncertainty of inferences can be gauged. Any violation of the principle of randomness results in sampling bias.

Generally, the need for controls will depend on the strength of prevailing evidence that constitutes the basis for comparison. When controls are included in a study, they should be comparable to the treatment group except for the factor that is being tested. If test and control groups are not comparable, any difference noted may be due to this lack of comparability rather than to the treatment itself. To evaluate the effects of treatment, usually it is advisable to include data on a group given a placebo. Conditions of observation on a control group must be the same as those on a test group.

A researcher may rationalize in order to avoid the embarrassment of not being able to provide an answer to an original question that was proposed. Thus, through faulty design or analysis, he may arrive at the correct answer to the wrong problem. In statistics, such errors are referred to as errors of the third kind. (An error of the first kind is the rejection of a given hypothesis when it is true; an error of the second kind is the acceptance of that hypothesis when it is false.)

If the period of exposure to risk is expected to vary from person to person in a study, it must be taken into account. This is accomplished by applying the person-years concept. Each person is credited with the length of time in which he remains under observation while being exposed to the risk, and any comparisons are made accordingly.

A cause and effect association or correlation cannot be established simply through the expedient of an uncontrolled association. Two variables are said to be associated or correlated if changes in one are accompanied systematically by changes in the other. A significant correlation does not necessarily indicate a causal relationship, since the correlation may be due to a common factor, particularly if time or space is involved.

Even if several independent studies indicate the same conclusion, this conclusion will not nec-

essarily be correct if the same fundamental fallacy is present in each. Also, a large number of samples will not compensate for faulty design and poor experimental technic. Quantity never is a substitute for quality in experimental research.

Extrapolation from animal data to human experience nearly always is hazardous.

Before accepting someone else's appraisal of a study, one must be sure that he has no axe to grind. Otherwise, he may influence the appraisal in his favor. An appraisal is best made by a person who is both an expert in the field and reasonably disinterested in the particular direction in which a study points.

The dangers of treatment are no less important than the assumed beneficial effects. So-called side effects may be severe enough to render an otherwise useful preparation useless.

Nearly every clinical trial involves some ethical problem. Failure to recognize this problem or to devise means to cope with it is the most serious error that can be committed in a medical study. The object is to retain the best design under the conditions permitted, and the conditions permitted are those dictated by the experience of others and the conscience of the investigator.

600 West 168th Street, New York 32, N.Y.

The language of the dentist

Julio Vitor. *Rev.A.odont.Argentina* 48:149-152 May 1960

Spanish is an exceptionally rich language and rarely lacks the words needed to express an idea. Recognition of this fact carries with it a determination not to accept vulgar mispronunciations or other linguistic faults which should be excluded from scientific and cultivated speech. Dentistry, like other branches of the healing arts, has undergone an enormous development in recent years and this development has led to the introduction of many new words. The addition of these new words to those already in existence has produced an extensive terminology with a large stock of synonyms.

The principal errors in dental terminology can be divided into (1) faults of diction, that is, the improper use of words, and (2) faults of syntax or construction. Faults of diction include barbarisms, neologisms, changes of gender, errors in accentuation, the needless use of foreign terms and Latin expressions, the use of hybrid terms in which Greek and Latin are combined, and the use of inappropriate or inadequate terms (such as pulpotomy for pulpectomy).

Faults of syntax are even more injurious to a language than the introduction of foreign words, because the syntax of a language is its distinguishing characteristic and gives it its individuality. Syntactical faults in Spanish include the use of the relative *que* when the Spanish idiom requires *cuando* (when) or *como* (how, in what way); the use of the gerund instead of a relative clause (for instance, a roentgenogram showing *instead of* a roentgenogram which shows); Italian forms of construction; and expressions in which the wrong preposition is used, many of which are traceable to the influence of French.

Dentists should insist on the proper use of dental terminology as an expression of culture, the basis on which rests the true progress of nations. Dentists should not be afraid of being considered pedants when they use the appropriate terms, even though those terms are synonyms or words that are rarely employed. A pedant is one who, although possessing only a superficial knowledge of a subject, sets himself up as an expert and constantly uses words with no comprehension of their meaning. When universities, in addition to their primary purposes of teaching and scientific investigation, begin to teach culture so that the professional men trained by them may count on an integral and well-rounded preparation, they will have remedied a defect in the mechanism of university education.

25 de Mayo s/n., Viale, provincia de Entre Rios, República Argentina

Analysis of methyl methacrylate copolymers by gas chromatography

John Strassburger, Gerhard M. Brauer, Max Tryon and Alphonse F. Forziati. *Analyt.Chem.* 32:454-457 April 1960

Detection, identification and quantitative determination of copolymers of methyl methacrylate which are employed as denture base resins, repair resins and room-temperature-curing filling mate-

rials have been accomplished by gas chromatographic analysis of the pyrolysis products. The sample is either pyrolyzed in a small still pot at 360°C. in air or on a hot coil placed directly in the carrier gas stream of the chromatograph. The pyrolysis products are carried through the column by a stream of helium and emerge from it in individual bands separated by zones of carrier gas. The components emerging from the column in the gas stream and their concentration are recorded as a function of time by a detecting instrument. From the time at which the various peaks occur the qualitative composition of the polymer is determined.

The procedure also distinguishes between polymer mixtures and copolymers and detects the presence of copolymeric constituents in percentages as low as 0.2 per cent. From the ratio of the peak areas of two or more representative peaks that are attributable to two components of the copolymer, its original composition can be estimated quantitatively with a precision of ±0.5 per cent.

The reliability probably can be further increased by increasing the number of analyses of standard polymers in the preparation of the calibration curve.

The analysis takes only a few minutes, can be readily adopted to copolymers other than those of methyl methacrylate, and is especially useful for quantitative determination of crosslinked insoluble materials.

Dental Research Section, National Bureau of Standards, Washington 25, D.C.

A census of dental resources [in Michigan]

Dale W. Podshadley. *J.Michigan D.A.* 42:252,254-259 July-Aug. 1960

Michigan is the only state in the Great Lakes region with more dentists today than in 1930. Although Michigan has experienced an increase in the total number of dentists, it has failed to maintain the ratio of dental manpower to population.

Of the 3,898 dentists in Michigan in 1959, 45 were engaged in full-time teaching or research. Michigan in 1959 had 331 clinical specialists, including 127 orthodontists, 117 oral surgeons, 31 periodontists, 30 prosthodontists and 27 pedodontists—these comprised about 7.3 per cent of the total number of dental specialists in the United States.

In 1959 about 14 per cent of Michigan's dentists were 65 years of age.

Michigan's two schools of dentistry are at the University of Detroit and the University of Michigan in Ann Arbor. Since 1945 the University of Michigan School of Dentistry has more than doubled its enrollment and now is graduating about 84 young dentists each year. The University of Detroit School of Dentistry has almost tripled its number of undergraduate dentists and is now graduating about 69 new dentists yearly. The two schools together have averaged 153 dental graduates in each of the last five years, of whom 90 per cent are practicing in the state.

Michigan is better supplied with dental hygienists than is the nation as a whole. In 1959, of the 655 dental hygienists residing in the state, 368 were employed in the practice of dental hygiene. Each of the afore-mentioned universities has a school of dental hygiene which together graduate about 67 women each year.

About 3,100 dental assistants were employed by Michigan dentists in 1959. Also employed were about 550 secretaries and receptionists. About 150 dental technicians were employed in private dental offices in Michigan in 1959, and another 550 technicians were employed by dental laboratories. Each Michigan dentist employs an average of slightly over one person to assist him in the office.

The mean office space per Michigan dentist is estimated to be 562 square feet, with the average one-chair office having 368 square feet and the average two-chair office 607 square feet. It may be assumed that the average Michigan dentist has two chairs. About 6,900 chairs are installed in private offices. About 78 hospitals have dental departments. The clinics at the University of Michigan and the University of Detroit have 227 and 90 dental chairs respectively. Thirteen local health departments have a total of 20 chairs.

Michigan has four centers for the treatment of children with cleft lip and cleft palate.

It seems likely that Michigan's dentist-population ratio will become less favorable in the future and that the demand for dental treatment will increase tremendously.

Northwest Corner Square, Greenfield, Ill.

New equipment

The information reported here is obtained from manufacturers. Dental Abstracts *does not assume responsibility for the accuracy of the information. The interested reader may direct his inquiry to the manufacturer.*

The "Remind-O-Gram," a stamp-sized, pressure-sensitive sticker with a protective back, is designed to be placed on the family calendar over the date of the next dental appointment. Each sticker has space for the patient's name, date and time. The message "has appointment with dentist" appears in bold red letters. Remind-O-Grams are available in book form, each book containing 1,000 perforated stickers. *William Getz Corp., 7512 S. Greenwood Ave., Chicago 19, Ill.*

A model no. TAB-8 wall-mounted "Abbeon" thermometer has an over-all diameter of 7¾ inches and a depth of 2½ inches. The instrument has a solid brass casing and weighs 1½ pounds. Claimed accuracy is within 1 per cent over the entire range from —30° to 230°F. *Abrax Instrument Corp., 179-15 Jamaica Ave., Jamaica 32, N.Y.*

A new professional jacket is available in a crossover style, with diagonal line and a standup collar. The jacket fastens with grippers. The breast pocket is divided into two sections. The jacket, with set-in back belt, is available in white poplin or white dacron and cotton. *Budget Uniform Center, 1613 Chestnut St., Philadelphia, Pa.*

Designed for precision work, the "Magniflex" lamp has an optically ground, double-convex magnifying lens, 5 inches in diameter. The lens has a focal length of 13 inches and a power of 3 diopters. A 22-watt circular fluorescent tube supplies cool illumination, free of shadows. The lamp is U.L. approved. A 26-inch swinging arm provides flexibility of movement. For literature write *Acme Lite Products Co., Inc., Congers, N.Y.*

Doctoral and Masters' dissertations

In this column each month are listed recent Doctoral and Masters' dissertations of dental interest, accepted by the dental schools or graduate schools in partial fulfillment for advanced degrees. Copies of many of these theses are available from the schools through interlibrary loan.

The rate of flow and chemical composition of the parotid saliva in children. *Elfriede Anna Specht. 1960.* M.S. *Northwestern University.*

Torsiversion of the maxillary first permanent molar and its relationship to arch form. *Larson Russell Keso. 1960.* M.S. *Washington University.*

Stability of the anterior teeth after treatment. *Jack Richard Martin. 1960.* M.S. *Washington University.*

Estimate of the maxillary supporting area and its relation to spacing-crowding variations. *Mark Jay Mayeau. 1960.* M.S. *Washington University.*

Influence of mandibular third molars on mandibular anterior teeth. *Leo Stifel Shanley. 1960.* M.S. *Washington University.*

Study of the relation of the height and width of the hard palate to articulatory defects of speech. *Fay Orion Wardlaw. 1960.* M.S. *Washington University.*

The pattern of positional relationships of the tongue during involuntary swallowing: a cinefluorographic study. *John R. Law. 1960. M.S.D. University of Washington.*

The assessment and localization of tooth size discrepancies as a factor in achieving an ideal interdigitation by orthodontic standards. *William S. Cooper. 1960. M.S.D. University of Washington.*

A functional stress analysis of the maxillary full denture base. *James R. Lambrecht. 1959. M.S.D. University of Washington.*

An eriochrome blue-se-edta method for the determination of calcium in saliva. *Donald N. Bechlem. 1959. M.S.D. University of Washington.*

An analysis of roentgenographic cephalometric methods of evaluating growth changes in the craniofacial complex. *Warren E. Costigan. 1960. M.S.D. University of Washington.*

A cephalometric comparison of skeletal and denture base interrelationships in edentulous males. *Richard A. Coulson. 1960. M.S.D. University of Washington.*

An evaluation of serial growth of the face by two methods of cranial base registration. *Edward J. Esselman. 1960. M.S.D. University of Washington.*

A serial study of the constancy of relationship of maxillary cephalometric landmarks as viewed in the lateral headfilm. *Andrew M. Houg. 1960. M.S.D. University of Washington.*

Hematologic investigations in man and animal after local anesthesia with "Xylocitin" (Haematologische Untersuchungen am Menschen und Tier nach Lokalanaesthesie mit "Xylocitin"). *Heinrich Lampe. 1960.* DR.MED.DENT. *University of Greifswald, Germany.*

Has arsenic acid bactericidal effects? (Wirkt arsenige Säure baktericid?). *Inge Lore Mieler. 1960.* DR.MED.DENT. *University of Greifswald, Germany.*

Comparison of the effects of "Nervepaste," produced by Fahlberg-List in Magdeburg with those of "Arsenic-free Devipulp," produced by Johannes Nagel & Co. in Leipzig (Ein Vergleich der "Nervepaste," von Fahlberg-List in Magdeburg mit dem "Devipulp arsenfrei" von Johannes Nagel in Leipzig). *Annemarie Heinrich-Stegemann. 1960.* DR.MED.DENT. *University of Halle/Saale, Germany.*

Clinical comparative investigations of the reliability of various dental focal tests (Klinische Vergleichsuntersuchungen über die Zuverlässlichkeit verschiedener Zahnherdtesten). *Claus-Dieter Boltze. 1960.* DR.MED.DENT. *University of Halle/Saale, Germany.*

Clinical investigations of the usefulness of the petechia test in diagnosis of dental foci of infection (Klinische Untersuchungen über die Brauchbarkeit des Petechientestes bei der Zahnherddiagnostik). *Heinz Koselack. 1960.* DR.MED.DENT. *University of Halle/Saale, Germany.*

Investigations of the relations between mandible and the facial skeleton important for correction of distal bite by using orthodontic appliances (Untersuchungen über das Verhältnis zwischen Unterkiefer und Gesichtsschädel wichtig für den Ausgleich eines Distalbisses mit kieferorthopädischen Behelfen). *Edouardo Madsen. 1959.* DR.MED.DENT. *University of Hamburg, Germany.*

Development of the deciduous dentition: its significance for orthodontic practice based on dental examinations of children between one and four years old. (Die Entwicklung des Milchgebisses: ihre Bedeutung für die kieferorthopädische Praxis gestützt auf die Gebissbefunde in Kindern von ein zu vier Jahren alt). *Rolf Gatzemeyer. 1960.* DR.MED.DENT. *University of Hamburg, Germany.*

Oral manifestations of keratosis follicularis: reports in recent medical and dental literature (Erscheinungen in der Mundgegend beim Morbus Darier im neueren medizinischen und zahnärztlichen Schrifttum). *Hans-Henning Storch. 1959.* DR.MED.DENT. *University of Heidelberg, Germany.*

Statistical report on the dental diagnoses made at the Dental Clinic of the University of Heidelberg from 1952 to 1958 (Statistischer Beitrag zur Begutachtung in der Zahn-, Mund- und Kieferheilkunde nach Untersuchungen am Gutachtenmaterial der Universitätsklinik für Zahn-, Mund- und Kieferkranke, Heidelberg aus den Jahren 1952 zu 1958). *Achim Haan. 1959.* DR.MED.DENT. *University of Heidelberg, Germany.*

Investigation of the presence of Lactobacilli in the saliva of rats (Untersuchungen über das Vorkommen von Lactobszillen im Rattenspeichel). *Karl-Heinz Döhn. 1959.* DR.MED.DENT. *University of Mainz, Germany.*

Teleroentgenographic examinations of the morphology of the jaws and the face in persons with normal or pathologic dentitions (Fernröntgenuntersuchungen der Morphologie des Kiefers und Gesichts bei regelrechten und abwegig gestalteten Gebissen). *Ruth Paszehr-Hitzacker. 1959.* DR.MED.DENT. *University of Mainz, Germany.*

Incidence, cause and significance of penicillin allergy in dental practice (Häufigkeit, Ursachen und Bedeutung der Penicillin-Allergie in der zahnärztlichen Praxis). *Georg Scheid. 1959.* DR.MED.DENT. *University of Mainz, Germany.*

Microscopic determination of the hardness of human enamel (Mikroskopische Härtebestimmung am menschlichen Zahnschmelz). *M. Schubert. 1959.* DR.MED.DENT. *University of Münster, Germany.*

Polarization-optical investigations of the initial caries of the enamel (Polarisationsoptische Untersuchungen der beginnenden Schmelzkaries). *Katharina Barbier. 1960.* DR.MED.DENT. *University of Münster, Germany.*

Quantitative determination of silicon in the hard tooth substances (Zur quantitativen Bestimmung von Silizium in der Zahnhartsubstanz). *Gisela Wüterich. 1959.* DR.MED.DENT. *University of Tübingen, Germany.*

Impression technics, especially the deglutition impression method (Tecnica delle imptonte, con speciale riguardo alla impronta di deglutizione). *B. Chotiner. 1959.* DR.MED.DENT. *University of Milan, Italy.*

Mandibular overjet: in Angle's Class III malocclusion (L' inversione dell' articolate: Angle's categoria III delle anomalie di occlusione). *A. Picozzi. 1959.* DR.MED.DENT. *University of Milan, Italy.*

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